

Dillon, John Talbot

Travels through Spain, with a view to illustrate the natural history and physical geography of that Kingdom, in a series of letters : including ... subjects contained in the memoirs of Don Guillermo Bowles, and other Spanish writers, ... / by John Talbot Dillon ...

Dublin : printed for S. Price [etc.], 1781.

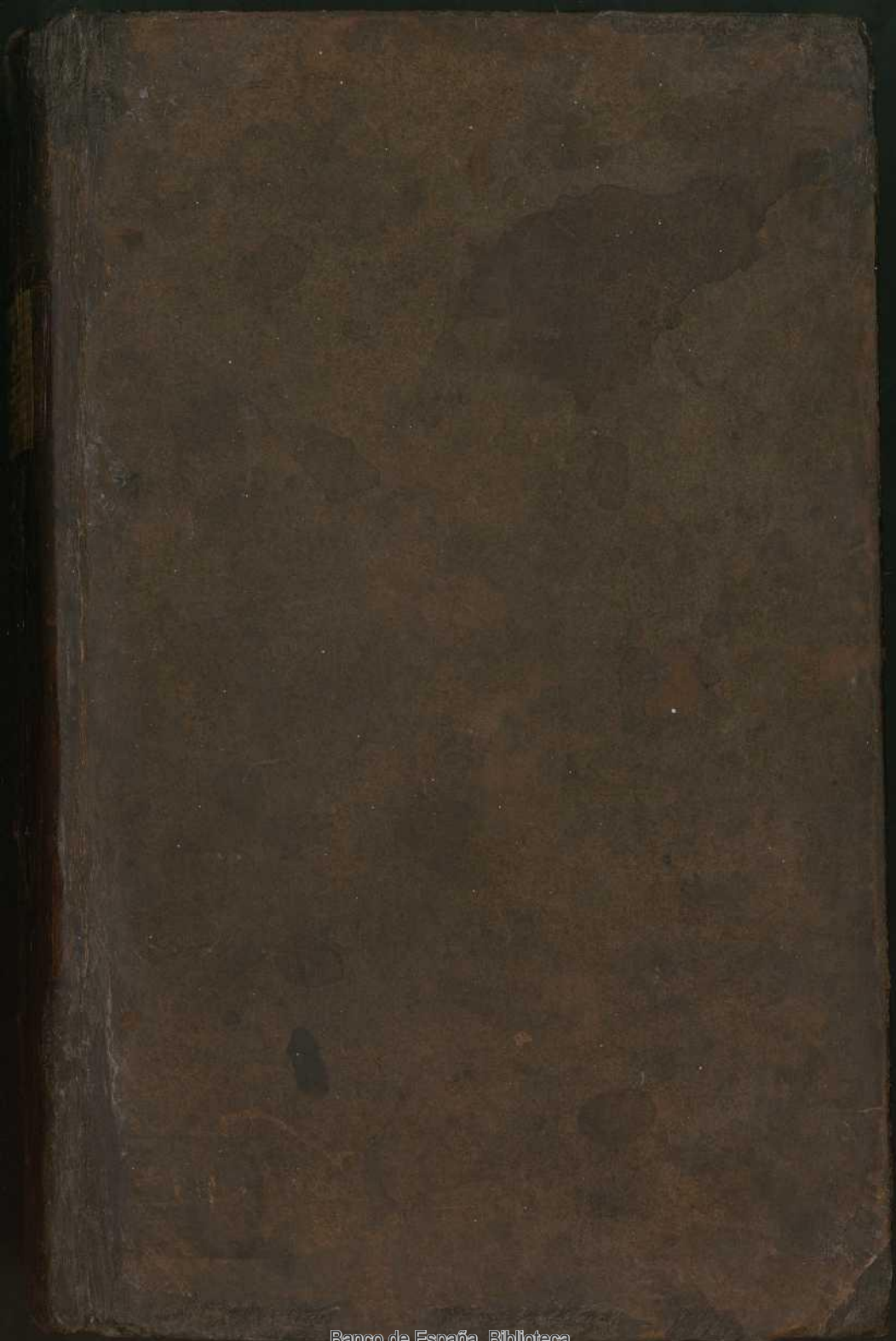
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SX/XX

Spain

Sir John Talbot Dillon (1744 -
-1805)

art critic Traveller etc

Baron of Holy Roman
Empire at Vienna
Kings from Spanish

Dublin, 1781 : in 2 Parts

Collected V.O.K.

See List of Spanish wines
& vegetables etc
of Gibraltar

Port, maps 3 plates

50



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CHARLES the III. KING of SPAIN &c.
In the Robes of the New Order of Carlos Tercero.

from the Original Picture of Antonio Velasquez.
Banco de España. Biblioteca

TRAVELS through SPAIN,

WITH A VIEW TO ILLUSTRATE THE

NATURAL HISTORY

AND

PHYSICAL GEOGRAPHY OF THAT KINGDOM,

IN A SERIES OF LETTERS.

Including the most interesting Subjects contained in the Memoirs of
DON GUILLERMO BOWLES, and other Spanish Writers.

INTERSPERSED WITH HISTORICAL ANECDOTES.

ADORNED WITH

COPPER-PLATES AND A NEW MAP OF SPAIN.

WITH

NOTES and OBSERVATIONS relative to the ARTS and
descriptive of MODERN IMPROVEMENTS.

Written in the Course of a late TOUR through that KINGDOM

By JOHN TALBOT DILLON,

KNIGHT and BARON of the Sacred Roman Empire.

*Lo unico a que puedo aspirar, es a la gloria de ser el primero que ha
intentado una descripcion fisica de este pais.*

DON GUILLERMO BOWLES.

D U B L I N :

Printed for S. PRICE, W. and H. WHITESTONE, T. WALKER,
W. GILBERT, C. JENKIN, W. HALLHEAD, L. WHITE,
C. TALBOT, and P. BYRNE.

MDCCXXXI.

TRAVELS through SPAIN

WITH A VIEW OF THE HISTORY

NATURAL HISTORY

PHYSICAL GEOGRAPHY

IN A SERIES OF LETTERS

TO THE RIGHT HONOURABLE THE LORDS OF THE TREASURY

AND THE HONOURABLE THE MEMBERS OF PARLIAMENT

BY JOHN TAYLOR

OF THE MIDDLE TEMPLE

IN TWO VOLUMES

LONDON

BY JOHN TAYLOR

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BY JOHN TAYLOR

OF THE MIDDLE TEMPLE

IN TWO VOLUMES

LONDON

TO
The Right Honourable
THOMAS LORD GRANTHAM,

L A T E
His Majesty's Ambassador at the Court of
M A D R I D.

This Work is most respectfully INSCRIBED,
By his LORDSHIP's
most obliged, and
most humble Servant,
JOHN TALBOT DILLON.

TO
The Right Honorable
THOMAS LORD GRANVILLE

His Majesty's Ambassador at the Court of
M A D R I D.

This Work is most respectfully inscribed,
By his LORDSHIP

most obliged, and
most humble servant,
JOHN TALBOT DILLON.

P R E F A C E.

AT my return from Italy in the year 1778, I once more visited Spain, and traversed the whole kingdom.* This journey afforded me the greater pleasure, from not only being versed in the Spanish language, but having made many friends and acquaintance during my former residence in that kingdom, besides being no stranger to their manners and customs; which circumstance greatly contributed to increase my amusement, and render my travels far more agreeable than they would have been to a person in a less eligible predicament.

On my arrival at Madrid, the ingenious and elaborate work of Don Guillermo Bowles,† first fell into my hands. This valuable treatise is designed as an introduction to the *Natural History and Physical Geography* of the
b kingdom

* This was my third voyage to Spain.

† Introduccion a la historia natural y a la geografia fisica de Espana, por Don Guillermo Bowles. Madrid, 1775, 4to.

kingdom of Spain, for the execution of which the author was very well qualified, having been employed many years by his Catholic Majesty in visiting mines and other purposes tending to the improvement of that kingdom, in different branches of mineralogy, and other useful arts. Upon the perusal of this production, it occurred to me that at a period when *Natural History* is so much cultivated, a more perfect acquaintance with a country, which had hitherto in this respect almost escaped philosophical enquiry, would meet the approbation of an English reader; more especially as we might be induced to expect from such a writer, abundant variety of accurate information, that could not be offered by any common investigator: particularly when the many inconveniencies of bad roads, and other embarrassments, that offer themselves perpetually in that kingdom, are considered. I have therefore availed myself of this work as my chief guide, with respect to the principal objects of natural history, without being a mere copyist in every minute detail; but on the contrary, such original remarks are offered as

I flatter

I flatter myself will not be unacceptable to the candid reader.

We are informed by Mr. Bowles, that having casually (in 1752) met with at Paris, Don Antonio de Ulloa, now an admiral in the Spanish fleet, he was induced by this gentleman to enter into the service of Spain, and that he soon after set out for that kingdom to receive his instructions, and to put them into execution. In this commission he was associated with Don Joseph Solano, who in 1773, was appointed governor of St. Domingo; Don Salvador de Medina, who died at California, whither he went to make observations upon the transit of Venus; and Don Pedro Saura, an advocate of Madrid. The two former gentlemen were naval officers and well known by their literary abilities and travels.

The first object that engaged Mr. Bowles's attention was an inspection into the quicksilver mine of Almaden, in La Mancha, at that time greatly neglected, though a place of the utmost consequence to the Spaniards, as they extract from the cinnabar ore of that mine,

b 2

the

the major part of the quicksilver that is requisite for the working of silver mines in America.—Mr. Bowles relates that he set out for Almaden on the 17th of July, 1752, and having with great attention visited the mines, he offered new proposals to the Spanish ministry, in which was contained a more eligible process than that which had been adopted for extracting the quicksilver, which was certified by experiments made on the spot, in the presence of the king's officers, which received the approbation of government, and served to fix him in their service. Several years after this first expedition he continued his progress through most of the provinces of Spain, of which he has given rather a desultory, though curious account, which he laid before the public, and published at Madrid in 1775, dedicated to his catholic majesty Charles the third.

In the letters which I now present to the public, I have included most of the observations and remarks of Mr. Bowles in the course of his various journies, from the year 1752 down to the present time, which were read with great applause by the Spaniards, and
bought

bought up with such eagerness, that in 1778 no copies were to be found. A translation was soon after made into French by the viscount de Flavigny, who has every where literally followed the original text, without any additional note or observation: * in the progress of a work of so extensive a nature, which comprises such a variety of subjects, we could not reasonably expect that Mr. Bowles, as a foreigner, and more particularly at his advanced age, could set before the public, in the metropolis of Spain, so elaborate a performance, without the assistance of a native perfectly acquainted with his maternal language, till now so little introduced in philosophical researches, though extremely copious and expressive.

Accordingly we find no less a person in the literary world than the ingenious and erudite Don Nicholas de Azara, the present Spanish agent at the court of Rome, the revisor of this work; but notwithstanding this extraordinary assistance, there remain many obscure passages

* Introduction a l'histoire, naturelle et a la geographie physique de L'Espagne traduit de l'original Espagnol de Guillermo Bowles, par le Vicomte de Flavigny. Paris, 1775. 8vo.

passages in different parts of the text, which necessarily render an exact translation extremely difficult, as well as tedious and disagreeable. Some passages are merely local, and would therefore afford little or no entertainment to an English reader. We find moreover, that in his introduction he is compelled, from a deficiency of expression applicable to his subject, to enter into tedious details. The ambiguity of the Spanish language perplexes him, and throws a cloud over his meaning. After this he further tells us, that he confines himself to no kind of order or method; one chapter treats of Valencia, the next of Aragon, another of Biscay, Catalonia, or the Escorial, and what is somewhat singular, the thirtieth chapter presents us with his first journey from Bayonne into Spain. Judging it expedient to avoid such confusion, I have endeavoured to arrange his materials in a proper manner; and have accordingly divided this work into two parts. The first comprises the journey to Madrid, by the way of Navarre, then I enter into a description of the northern parts of Spain, which includes many remarkable objects in Castile, Aragon, and Biscay.

Biscay. In the second part, departing from Madrid, I traverse the provinces of Estremadura, Andalusia, Grenada, Murcia, Valencia, and Catalonia; and though many of these districts have been the immediate objects of my observation, I ingeniously acknowledge that the chief remarks, with regard to the natural history of those provinces, are from Mr. Bowles's valuable memoirs; where I have differed from in opinion, my objection is thrown into a note; and where I judged extraneous matter was introduced, it is suppressed; upon the whole, if I can derive the merit of giving these sheets an English dress, or afford any kind of novelty by enlivening the text, I shall be satisfied in having compassed my design; more especially, if the literati should indulge me with the opinion, that I have offered them any thing deserving their attention, which has not appeared before in print, occasioned by the dearth of research in a country so rich nevertheless in materials, that Mr. Bowles justly calls it "A Virgin Land."

There are, I flatter myself, some parts of this book, which cannot, in any respect, be considered as borrowed from Mr. Bowles's work:

work; in those parts the historian and the antiquary may probably meet with such detached pieces, as have hitherto escaped their observation. I must acknowledge that I am likewise indebted to the works of the celebrated Don Antonio Ponz, secretary to the royal academy of San Fernando at Madrid, whose travels through Spain have met with universal applause and recommended him to the royal favour. As the extensive circulation of Ponz's works induced Mr. Bowles not to quote from them, I have been prevailed upon to avail myself of them, judging they would be agreeable to the English reader, and have endeavoured to blend the quotations with the text, in such a manner as I deemed would render them the most acceptable: my design being merely intended as an essay to afford a guide to future travellers. It is offered to the public in the flattering expectation that it may stimulate more capable travellers to investigate the subjects it treats of with greater judgment and accuracy. A summary account of the mineral waters of Trillo is introduced with a similar view. It is selected from the judicious treatise of Dr. Ortega, F. R. S. and I am indebted

debted to the observations of the late Don Joseph Quer, his Majesty's Surgeon, for what is offered on the virtues of the Perennial leaved Strawberry tree.

If it should be urged that I have taken too great liberties with Mr. Bowles's text, let it be remarked, I have invariably prefixed his name at the head of each letter, any part of the contents of which is borrowed from him, to acknowledge fairly my obligation. I have likewise endeavoured to do justice to his ideas as far as the great variation of idioms would allow; it being as distant as possible from my intentions to depreciate in the smallest degree, the extraordinary merit, which must impartially be ascribed to his uncommon talents. To what I have said I must subjoin that it never was my intent to produce a translation of his book; of which many curious pieces are omitted relative to *platina*, the Mexican mines, and other miscellaneous matter. On the whole I have aimed at catching the quintessence of his book. I have ventured to communicate it to my countrymen for their instruction, benefit, and entertainment. How far

far I have succeeded, I leave to the candid, the intelligent reader; but shall venture to say with Wentworth Dillon, Earl of Roscommon,

The genuine sense intelligibly told,
Shews a translator both discreet and bold.

It now behoves me to apologize for the many defects and imperfections that will present themselves to the eye of criticism in the course of perusing this work. Should my style appear cold and inanimate when I climb the bleak snowy mountains of Aragon and Biscay, how much more must I dread langour and torpidity in the fruitful plains of Andalusia and Granada; or amidst the flowery lawns of captivating Valencia. But thus situated at the bar of criticism, I trust myself to the candour of my jury, the impartial public; let me plead in defence of any defects in language, a long absence from my native country, which however afforded me great satisfaction, more particularly at the Court of Vienna, from the extraordinary favours I had the honour to receive there from two successive emperors.

It yields me a most flattering retrospect to repass in my memory, the various friendly offices I received from many distinguished persons, during my tour through different parts of Spain, and also the assistance of some of my friends in England, in the execution of this design. I hope my learned friend, Dr. Withering, will please to accept my sincerest acknowledgements for his very liberal assistance and obliging revision of this work. I am further particularly indebted for many communications to a Gentleman, whose long residence in Spain, gave him the best opportunities of information, equal to his kind disposition to promote literary researches there, and to whose friendly assistance the first historian of the age has expressed such particular obligations.

The reader need not be surprized that I have not engaged in politics, naval or military operations: they were foreign to my subject, which leads not to speak of fleets or armies, or the efforts of contending princes, no more than of national characters. The researches of nature alone, and the admiration of providence in their discovery, afford an ample field

field for the philosophic traveller! If I have sometimes expatiated on the qualities or excellence of Spanish productions,* I hope, nevertheless, it will not be thought, that I mean to lessen or feel less warmth for the innumerable advantages of my own country, wherein, if we have not the rich fruits of the southern climes, we enjoy so many other essential benefits, superadded to the greatest abundance of every necessary, every convenience of life, as cannot fail, from our insular situation, to render us a most happy people. Thus even supposing for a moment we grant to other nations every advantage of a luxuriant climate, or that the Spaniard lives in ten degrees of more indulgent skies;

'Tis Liberty that crowns Britannia's isle,
And makes her barren rocks, and her bleak
mountains smile.

A D D I S O N.

BIRMINGHAM, April 15, 1780.

* Even the great Linnæus, speaking of the natural advantages of the climate of Portugal has said, Bone Deus! Si Lusitani noscent sua bona naturæ, quam infelices essent, plerique alii, qui non possident terras Exoticas. See Linnæus in epistola die. 12 Februarii, 1765.

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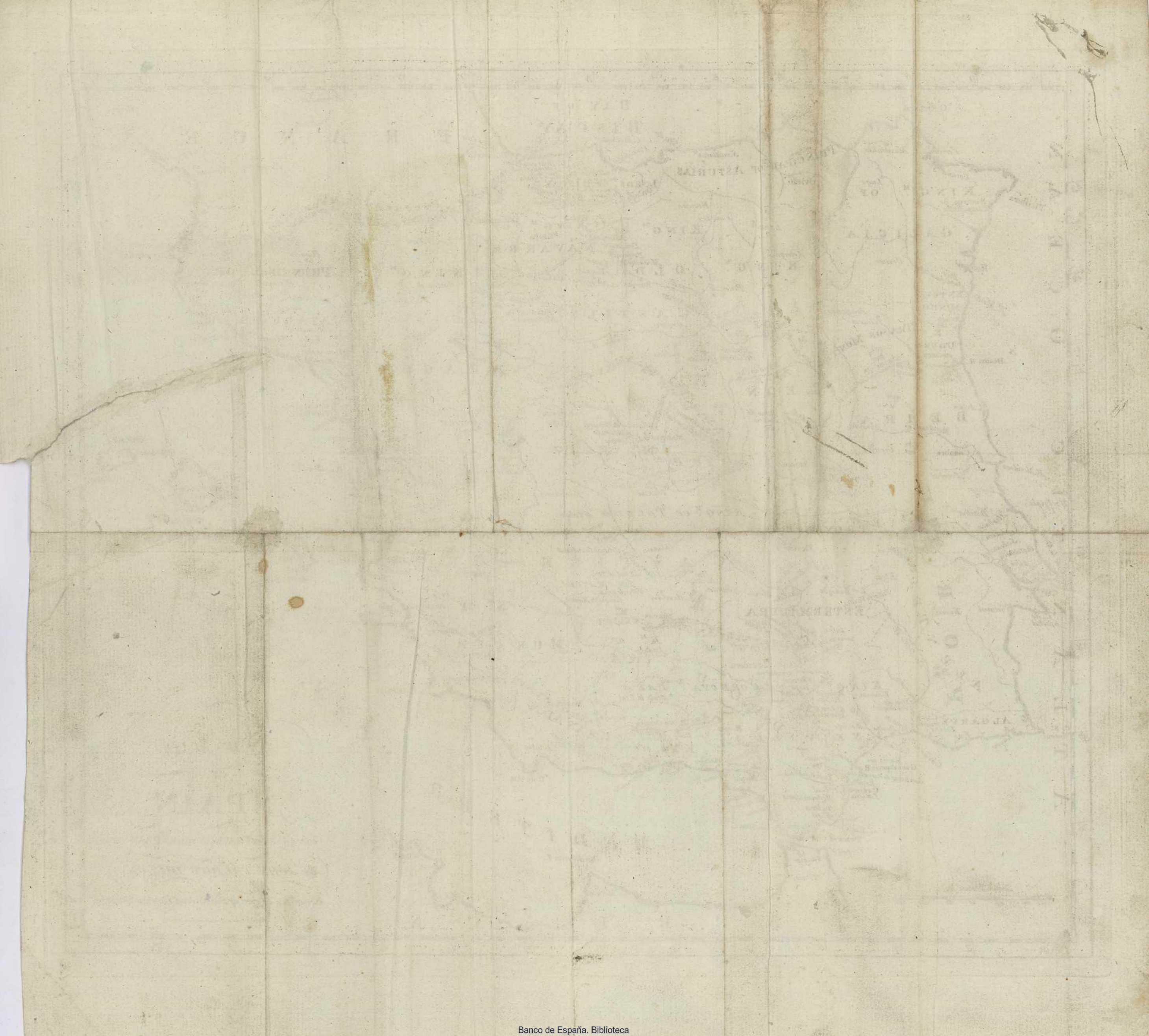
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FRONTISPIECE, Charles the III^d. king of Spain, in the robes of the new order of Carlos Tercero, instituted the 19th of September, 1771.

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and
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TRAVELS through SPAIN;

WITH A VIEW TO ILLUSTRATE THE

Natural History and Physical Geography

OF THAT KINGDOM.

P A R T I.

L E T T E R I.

Division of the kingdom of Spain.

THE dominions of Spain are generally classed by their writers in the following order. The kingdom of Spain, consisting of Old and New Castile; the kingdoms of Leon, Arragon, Navarre, Granada, Valencia, Galicia, Seville, Cordova, Murcia, Jaen, and Majorca; the principalities of Asturias, and Catalonia, the provinces of Estremadura, Guipuscoa;

coa, and Alava, and the lordships of Biscay, and Molina: they are bounded by the Cantabrian ocean, or bay of Biscay, on the north, by the Pyrenean mountains and the Mediterranean towards the east; by the freights of Gibraltar and the Mediterranean, which divide it from Africa, on the south, and by the great Atlantic ocean on the west: lying between 36 and 43 degrees of north latitude, and between 8. 22. longitude, reckoning from the island of Ferro, the most western of the Canary islands.* The Pyrenean mountains are the highest in Spain, extending from the ocean to the Mediterranean, several others branching out, as from their root, such as mount Idubeda now called Montes de Oca, the Orbion, Moncayo, the Puerto de Pajares, or pass from Castile to Asturias, the Puerto de Guadarrama, which separates the two Castiles, that of Molina, of Cuenca, of Consuegra, of Alcaraz, of Segura, of Cazorla, and the Montes Marianos now called the Sierra Morena: † the

* Description de la provincia de Madrid, por Thomas Lopez. Madrid, 1763, 12mo.

† *Sierra* is a general name in Spain for all wild districts whose rugged appearance seems to resemble the notches of a saw (which is *Sierra* in Spanish). Of these places the Sierra Morena in Andalusia is one of the most extensive and bleak. Translated literally it answers to our English word, Black-Heath.—The inhabitant of such a country is called *Serrano*, and if the district is small, it is called *Serrania*.

the Puerto del Rey, ‡ which commands the communication between Castile and Andalusia, and the Puerto del Muradal, where lies that famous pass called las Navas de Tolosa, celebrated for the victory obtained there in 1212 over the king of Morocco, and other passes of less note.

Amongst the rivers, the Ebro has its source near Fontibre, six leagues from Aguilar del Campo, passes by Logrono, Viana, Calahorra, Tudela, Zaragossa, Mequinenza, and Tortosa, and a little lower falls into the Mediterranean at the Alfaque islands.

The Guadalquivir has its source in the Sierra de Segura, passes by Beas, Baeza, Andujar, Cordova,
B 2 Loxa

‡ The word *Puerto* is applied to passes from one province to another where duties are paid. I could not help smiling to read in a modern geographer, that *Ordunna*, (because there is a *Puerto* there) has a good harbour, when it is an inland city seven leagues from Bilbao. J. Barrow's geog. dict. 2 vol. fol. 2d edition revised and corrected, 1763.

At many of these *Puertos* there are ludicrous duties established, as for example, at the *Puerto del Rey* in Sierra Morena a singular toll is paid for monkeys, parrots, negroes, and guittars unless played upon at the time: married women unless in company with their husbands, or producing certificates;—viz. for any monkey, parrot or singular bird, one *real vellon*; a guittar, one *peseta*; any drum, unless the king's, one *peseta*; a woman as above described, one *real vellon*; a travelling mule, one *quarto*.

Loxa and Seville, and enters the ocean at San Lucar de Barrameda, receiving in its course the waters of the rivers Guadalbullon and Genil.

The Tagus rises in the Sierras de Albarracin, passes by Zurita, Aranjuez, Toledo, Almaraz, Alcantara, Abrantes, Santarem, and Lisbon, where it is three miles broad and enters the ocean, having the tide as high as Santarem, and receiving in its course the waters of the Jarama, Manzanares, Guadarama, Alberche, and others.

The Guadiana rises about four leagues from Montiel in the Laguna Ruydera, and after running under ground appears again near Damiel at the lakes or lagunes called *Ojos de Guadiana*, "the eyes of Guadiana," then passes by Calatrava, Ciudad Real, Medellin, Merida, Badajoz, and Ayamonte, where it falls into the ocean, after running for some time in Alentejo, in Portugal, and separating that kingdom from Spain, having Castro Marin of Portugal on the west, and Ayamonte on the east.

The Duero rises in the Sierra of Orbion and passes by Soria, Almazan, Osma, San Estevan de Gormaz, Aranda de Duero, Roa, Simancas, Tordesillas, Toro, Zamora, Miranda de Duero, Lamego, and enters the ocean at Oporto, receiving the rivers Eresma, Adaja, Pisuerga, Ezla, Agueda, and others.

The

The Minho has its source in Galicia near Castro del Rey. It runs South West and passes by Lugo, Orrense and Tuy, after which it divides Galicia from Portugal, and falls into the Atlantic at Caminha.

Other smaller rivers are also worthy of notice such as the Segura, Guadalaviar, Lobregat, Caya, Vidafo, Tinto, Guadalate, &c.

Spain may be said to enjoy a temperate and healthy air, neither so cold as the northern regions, nor so burning as the scorching heats of Africa, and abounds in cattle, game, fowl, corn, wool, silk, wax, honey, excellent wine, brandy, oil, and sugar, all kinds of fruit and pulse, aromatic herbs and plants, the finest of oaks, quarries of marble, alabaster, jasper, and other precious stones; mines of silver, lead, copper, iron, mercury, antimony, and cobalt: in short every natural advantage tending to the pleasure and happiness of mankind.

The territories of Spain are said to contain 25,000 square leagues.* According to returns made to the Count de Aranda in 1768, the general population

* The Spanish league is 7680 varras. 17 Spanish leagues make one degree, equal to 20 French leagues.

Three Castilian feet make one *vara* of Castile, whose length is about 33 inches English.

population of the whole, including the Canaries and Mediterranean islands, amounted to about nine millions of souls. In the year 1778 it was further calculated to be between ten and eleven millions, and supposed to be increasing.

L E T T E R II.

Itinerary from Bayonne to Pamplona, and from thence to Madrid. A mine of sal gem at Valtierra described.

QUITTING Bayonne I proceeded on my journey towards Spain,* and travelling through an uneven country, I began to perceive a species of flaty stone which announced the vicinity of the Pyrenees about half a league distant. The environs of Anoa are mountainous. The farmers manure the ground with lime to sow maiz or Indian corn, laying on a greater quantity for wheat, without which it yields nothing, which proves the necessity of this method to cherish and expand the tough and cold soil in mountainous countries.

Half

* The itinerary of Mr. Bowles is supported in this letter, with respect to natural history, and further illustrated with the historical part not mentioned by that writer.

Half a league from Anoa a rivulet forms the boundary between France and Spain. The country is covered with fern, which they cut and heap in piles, till it rots and serves for manure. In the arable land, and where cattle have grazed, there are two kinds of mint, ground ivy, and other usual plants. You next pass a Carthusian convent at the foot of a high mountain chiefly of quartz, § whose summit is a rock of purplish sand, and from thence descend to the first village in Spain called Maya, seated in a valley where they have good crops of maiz and turneps, and whose soil though not calcareous produces equally the same kind of plants. Such as the elder, henbane, nightshade, swallow wort, figwort, thornapple, hawthorn and bullace tree. After passing the village of Elizondo and traversing the vale, I ascended a mountain of blueish lime rock with fine beech towards the top, its sides lined with many other trees, such as elder, hawthorn, and holm. This mountain is one of the highest in this country; but in speaking of the plants found here, I only mean such as are seen in that part still uncultivated, for where the ground has been opened, and

§ Quartz is a hard vitrifiable stone, something intermediate betwixt rock crystals and flints or opaque vitrifiable stones, well known to metallurgists, mineralogists, and miners. According to Cronsted, it is easier to be known than described.

and near the inn called Venta de Belate, not far from the top of the mountain, being accessible to animals, the following plants are to be seen,celandine, mint, cuckowflower, crowfoot, plantain, fowthistle, figwort, archangel, dock, arsmart, and two sorts of maidenhair on the walls, from whence I judge that if a house was built on the highest and most barren mountain, and the ground manured with the dung of animals, we should soon perceive the same plants that are observed in the neighbourhood of villages and in plains, and that it is not a good rule to judge of the height of a mountain by the appearance of plants, if no distinction is made between the spontaneous ones and the others, else we might conclude that the little hill of Meudon near Paris is as high as the Pyrenees.

From the Venta de Belate it is an easy descent into another vale well cultivated with vines and corn, which extends as far as the city of Pamplona, capital of the kingdom of Navarre. In this vale there is a wood of stately oaks, with plenty of box, thorn tree, wild roses and other common plants of cultivated countries. You keep constantly on the borders of a rivulet running amongst round sandstone of a purple colour, similar to those on the other side towards France. I saw the following plants in the plains of Pamplona, on the side of the roads, in the fields and the vineyards; two sorts of eringo, one called the hundred headed fort,

fort, and the other with large leaves, poppy, dock-weed, white horehound, vipergrafs, elder, white goosegrafs, devilbit, cinquefoil, crosswort, henbane, tutfan, agrimony, teasel, hawthorn, rest harrow, crowfoot and bullace.

In this plain it is clearly seen how the limy rock decays, for in an almost perpendicular fissure above an hundred feet high, the earth which at first sight and even to the touch appears to be clay, is nothing more than limy earth, mixed with a small portion of clay, the result of rotten plants as I experienced with the acid I always carry with me when I travel. The same sort of earth of a blueish colour is found near Pamplona, but harder, and so very hard in a hill opposite to the city, as to deserve the name of stone, disposed in strata with the same obliquity as the fissure abovementioned, all which proves the decomposition of the rocks.

Leaving Pamplona, I traversed a champaign country for two leagues and a half to the mountain opposite, which having passed, a variety of cultivation takes place. Some limy rocks are so barren, that nothing is to be seen but butchers broom, a few oaks, juniper, and lavender, for two leagues and a half further, when I arrived at the city of Tafalla; then passing an extensive plain full of aromatic plants, had five leagues to Caparoso.

roso. This plain may be thrown into four divisions, the first from Tafalla being olive trees, the second vineyards, the third corn-fields, and the fourth barren, except a few olive trees and some corn-fields near Caparroso, where a hill divides the plain, and now and then, the rounded purple stone shews itself again the same as in France.

From Caparroso I crossed a high hill where any miner might mistake the strata of gypseous stone which is only one or two inches thick, for spar, but you may dig as deep as you please, and never find any thing but gypsum, which is very seldom seen where there is mineral. The country is every where barren and miserable, a perfect desert without water, and nothing but rosemary, lavender, and a few starved oaks. After quitting this wretched district a fertile plain opens to the eye, supplied by wheels with water from the Ebro, and here I saw the tamarisk, which is a beautiful plant when in flower.

From Caparroso it is four leagues to the Ebro in a plain bordered by a chain of hills from east to west, composed of limy earth mixed with gypseous stone, sometimes in strata, granulated, or in masses, white as snow. This chain extends about two leagues, and towards the middle, where it is the highest, stands the village of Valtierra: about half way up, there is a mine of fossil common salt,
which

which being transparent and resembling chryſtal, goes by the name of Salgem, and is ſeen above ground where the ſhaft is made at the entrance of the mine. About twenty paces within, one obſerves that the ſalt, which is white and abundant, has penetrated into the very beds of gypſeous ſtone. This mine may be about four hundred paces in length, with ſeveral lateral ſhafts, upwards of eighty paces, ſupported by pillars of ſalt and gypſum, which the miners have very judiciously left at proper diſtances, ſo that it has all the appearance of a gothic cathedral. The ſalt follows the direction of the hill, inclining a little to the north, like the ſtrata of gypſum, being comprised in a ſpace about five feet in height without variation, and ſeems to have corroded ſeveral beds of gypſum, and marl, and inſinuated itſelf into their place, though much of thoſe ſubſtances ſtill remain.

At the end of the principal ſhaft, the miners have carried out a branch to the right, where the ſaline bed appears to have followed exactly the inclination of the hill, which in that part is very perpendicular: this ſtratum of ſalt deſcends to the valley, and goes on to the oppoſite hill; which regularity deſtroys the ſyſtem of thoſe who pretend that ſal gem is formed by the evaporation occaſioned by ſubterraneous fire. If this was the caſe, the beds would not be undulated in this manner, reſembling

resembling those of coal at Chamond, near Lyons, in France, or those of asphaltos,* in Alsace, that follow the elevation and declivity of the hills or vallies, the bitumen often floating on the water when it meets with it. I am of opinion that salt grows in the mine like minerals, that coal is the product of fossil wood, as appears from such remnants as are found in the mines, § and that the asphaltos

* *Asphallos* or *Jewish bitumen* is so called from the lake Asphaltites or dead sea in Judea, which rises up in the nature of a liquid pitch, and floats upon the surface of the water like other oleaginous bodies, and is condensed by degrees through the heat of the sun; the Jews formerly used it to embalm their dead. The Arabs gather it for pitching their ships, but the Europeans use it in medicinal compositions, especially in theriaca, or Venice treacle; also for a fine black varnish, in imitation of that of China. Rolt's dict. of commerce. London, 1761.

The origin of bitumens is an interesting question, concerning which naturalists are not agreed, some imagining that they essentially belong to the mineral kingdom, and others that they proceed originally from vegetable substances; we must allow this latter opinion to be the most probable, &c. See dict. of chemistry, translated from the French. London, printed for T. Cadell, 1777.

§ It has been asserted that coals being sometimes produced from clay saturated by petroleum, may be found in any place or situation where clay or argillaceous slate is to be met with, in ancient simple or modern stratified mountains, as well as on, and in volcanic mountains, and that
henceforth

asphaltos is produced by the water of some spring. I examined attentively these strata of salt, comparing them with the matter in which they are embedded. I observed the roof to be of gypsum with aromatic plants, then two inches of white salt, separated from the gypsum by a few threads of saline earth, then, three fingers breadth of pure salt, with two of stone salt, and a coat of earth, next another blueish bed, followed by two inches of salt; and lastly, other beds alternately of earth and chrystaline salt to the bed of the mine, which is gypseous stone undulated like the rest, descending to the valley, and rising on the opposite hills. The strata of saline earth are of a dark blue, but those of salt, are white. This mine is of a great elevation with respect to the sea, for you always go up hill to it from Bayonne, excepting those casual descents which are inseparable from mountainous countries.

It is a continual ascent from Valtierra to Agreda, the first town in Castile, on the top of one of the highest mountains in Spain called Moncayo, whose rocks so decompose into earth, as to be covered

henceforth coals will not be considered as constantly produced from trees, plants, and forests, buried by inundations, though many coal mines may have had such an origin. See Ferber's mineralogical history of Bohemia, page 308, note 5, prefixed to Baron Born's travels through Transilvania and Hungary, translated by R. E. Raspe, London, 1777.

vered with plants, deserving the attention of a botanist, from the great variety thence afforded in the vegetable kingdom. From Agreda the country is well cultivated to Hinojoso, without any trees or plants, as far as Almeriz, and forwards to Almazan, on the banks of the Duero: examining this district, which produces wheat and barley, I discovered lime rock at a few feet from the surface, which for a great extent has an outward coat of sandy soil, with quartz and sand stone totally different from the bottom, which gives it the appearance of a foreign matter brought from a distance. The phænomenon is singular, and those who are fond of hypotheses have here an ample field to employ their imagination.

Leaving Almazan, you rise upon an eminence which affords an extensive prospect, the country at a distance having the appearance of a plain, the eye not being able to catch the many irregularities of ground. After some leagues of uncultivated land, the country improves; three leagues and a half further, I came to Paredes, and crossing a barren plain, arrived at Baraona, then passing over the steep hill of Atienza, the confines of the two Castiles, I came in five hours to Xadraque, and four leagues further, to Flores; about half way, there is a place where there are hills with great clefts; one evidently sees they were caused by the rains which carry away the limy earth, and that

that all that country had been a plain, for the parts that remain without gullies, have a bottom of hard rock, and in proportion as the water makes its way through, they form gullies; I saw some just beginning, with a likelihood of rising into hills in the course of twenty years; from whence I conjecture, that if some hills give way, and crumble into plains, others, in the course of time by the motion of waters, gradually form themselves into mountains.

In passing this road, you go through a wood of scarlet oak, whose leaves are covered with the gall insect, and on coming out of the wood, find a well cultivated country with vineyards, corn fields, and plenty of lavender, thyme, lavender cotton, and sage; then pass by the village of Hita at the foot of a pyramidical hill, rearing its lofty crest above the others, like a great rock in the sea, with an old Moorish castle on its summit.

Having crossed the river Henares you enter a fertile plain with a great deal of small grained sandy pebble. It is remarkable that on entering New Castile, stone of this kind is always found, even in hills of limy earth: after passing a range of cultivated hills I arrived at the famous city of Alcala de Henares, with an university founded in 1499, by that great statesman Cardinal Ximenez de Cisneros, who also endowed it with a good library,

brary, and printed here, at his own expence, the first polyglot bible, known by the name of Complutensian. The university is a handsome structure, Ximenes is buried in the church with an elegant monument, by Dominico of Florence. The medaillon of the Cardinal has been removed from the tomb into the library. Before I leave Alcala, let me entertain you with a story related by the witty Don Antonio Ponz, secretary of the royal Academy of San Fernando, at Madrid, in his tour through Spain, who, visiting the convent of San Diego, belonging to the Franciscans, thus expresses himself; "I could not swallow two pills that my conductor endeavoured to ram down my throat, which, for his part, he seemed to have very easily digested. He shewed me a picture of St. Jerome in a cardinal's robe, and a red hat, which is quite out of character, and wanted to persuade me it was a portrait of Cardinal Wolsey; after that would make me believe it was valued at fifteen thousand dollars (£ 2500) though I was startled at the sum, I did not choose to displease the person who was doing me a favour. I must not forget to tell you I also saw, in a chapel, on the altar of St. Francis, the head of that saint in clay, painted to imitate nature. I do not know what you will think of the manner in which I was assured it was made; a potter had placed his vessels in the oven to be baked, and behold one of them came out changed

changed into this head ! you may believe it if you please ; many believe it at Alcala ! for my part, as I know no other circumstances of this miracle, and have no other authority than that of my guide, with his tale about the fifteen thousand dollars, I am rather suspicious.” *

Alcala is only six leagues from Madrid, and belongs to the Archbishop of Toledo ; it gave birth to Miguel Cervantes de Saavedra, the celebrated author of the much admired romance of Don Quixote. § The country around is bleak, owing
C to

* Viage de Espana par Don Antonio Ponz, tom. 1, Madrid, 1776.

§ Miguel Servantes de Saavedra was born at Alcala de Henares the 9th of October 1547, and died at Madrid the 23d of April 1616. The same nominal day as his illustrious cotemporary Shakespeare.

There is such a variety of matter and so many beautiful passages and allusions in Don Quixote, that it is impossible to travel through Spain, without their frequently occurring to the mind. Don Guillermo Bowles has occasionally quoted him, and I hope I may be allowed the same liberty. This book is one of those capital pieces only understood by those who can read him in the original. We may now soon expect a new and classical edition of Don Quixote printed in England in the original Spanish, illustrated by annotations and extracts from the historians, poets, and romances of Spain and Italy, and other writers ancient and modern,
with

to the singular aversion which the Castilians have in general to the planting of trees. Nothing further occurs between this place and Madrid, the environs of which will be described on another occasion.

L E T T E R III.

Natural history of the Grana Kermes, or scarlet grain.

AMONGST the various and valuable productions with which the beneficent hand of nature has enriched the dominions of Spain, the *Grana Kermes* is chiefly deserving of attention. This valuable production had been considerably neglected in that kingdom since the importation of cochineal from America; however, the royal Junta de Comercio, or board of trade at Madrid, having an eye with a glossary and indexes, by the Reverend John Bowle, M. A. F. S. A. London printed for B. White, 1777.

Besides the advantage of having a more perfect and accurate text than has ever yet appeared, this is a work of such magnitude as will reflect infinite honour on the erudition and taste of the ingenious editor; how singular a pleasure to the admirers of Cervantes in general! how great the surprize to the Spaniards! when they behold one of their favourite characters so nobly emblazoned by an Englishman.

eye to the further advantages to be drawn from this precious article, gave orders a few years ago to Don Juan Pablo Canals, director general of the madder and dyes of Spain, to report the state of this product; and to him I am indebted for the present information on this subject.*

The grana kermes is the *coccus baphica* of the Greeks; the vermiculus, or coccum insectorium of the Romans; and the kermes, alkermes, of the Arabs; being the ingredient with which the ancients used to dye their garments of that beautiful grain colour, called coccinus, coccineus, or cocceus, different from the purpura of the Phœnicians, which at first had been obtained from that testaceous fish, called the murex.† But in course of time the purple colour and other tints having

C 2

been

* Memorias que de la real junta general de comercio y Moneda se dan al publico sobre la Grana Kermes de España. Por Don Juan Pablo Canals y Marti. Madrid, 1768.

† Tyrioque ardebat murice lana. Virg. Æn. lib. 4.

Though the dye obtained from the murex was thought to have been lost, it seems to be known on the coasts of England, France, Spain, and the West Indies, though neglected on account of the great trouble and expense. See Padre Feijoo Theat. critico, tom 6, disc. 4. According to Gage, they find a shell fish in the seas of the Spanish West Indies, which perfectly resembles the ancient purpura, and

been more easily effected by means of the kermes, the murex was neglected on account of the expence, and the kermes we are now speaking of, was introduced; which giving a stronger and brighter colour, was universally adopted, and supported its reputation for ages, till the discovery of America; as is evident from the many old tapestries, damasks, and velvet hangings, still preserved in cathedrals, which seem yet to retain their primitive lustre and brightness. †

In the reign of Lewis the fourteenth, Giles and John Gobelin, in the year 1667, under the patronage of Colbert, introduced the secret into France of dying woollen of that beautiful scarlet called after their name, which was done with the kermes that had been long in use in Flanders, where many old pieces of tapestry, though above two hundred years old, had scarcely lost any thing of their bloom. But cochineal, being now introduced into the dyehouse, so called from the latin word *coccinella*,

and in all probability is the same. Cloth of Segovia dyed with it, used to sell for 20 crowns the ell, and none but the greatest Spanish lords wore it. Don Antonio de Ulloa also gives a particular account of this fish, and the use made of it in America. See gentleman's magazine, for October and November, 1753.

† This was the colour called *carmesi*, by the Spaniards; *cramoisi*, by the French; and *crimson*, by the English.

nella, as a diminutive of *coccum*, and giving that brightness to scarlet, at first called Dutch, and afterwards Paris scarlet, the invention of which, according to Kunkel, is owing to Kuster, a German, by means of a solution of tin in *aqua regia*; the kermes then began to decline, and yield in its turn as the *murex* had done before, of which Colbert makes a particular complaint, in his general instructions to the dyers of France, in the year 1671. § Insensibly, the kermes was totally laid aside, and cochineal made use of, not only in yarns, but also

§ As the Phœnicians neglected the ancient purple, and gave a preference to the scarlet, whose colour is less costly and more beautiful; just so, the French have forsaken our scarlet for that of the Dutch. This new-invented colour was at first in esteem on account of its brightness; but being less durable than that of France, and under a notion that they were both equally liable to spots, they were soon laid aside, which occasioned the downfall of our most valuable cloth manufactures, where this colour was so much in use, particularly amongst our nobility, that few were without a scarlet cloak of cloth, much preferable to those of Barracan now in fashion, which are of foreign manufacture, less becoming, and also dearer, if we consider the short time they last. Chap. 304. "Again, in the "next chapter:" Therefore, to reinstate our cloth manufactory and vermilion dye, (the kermes) it should be introduced amongst the nobility and army as the noblest of colours, most suitable to their rank; besides cloth being more serviceable, either of this, or any other colour, than those flimsy Barracans, we import from abroad. General instructions of Colbert, 1671.

also in silk; this new method being every where in fashion, except at Venice, and in Persia, for scarlet, and in other parts of the east for crimson.

The ancients thought the kermes was a gall-nut on account of its figure and size, not being larger than a juniper berry, round, smooth, glossy, and rather black, with a cinerous down. It is found sticking to the branches, or tender leaves of the oak called in Spain *coscoxa*, a derivative of the latin word *cusculium*, the *coccus ilicis* of Linneus, likewise called *carraasca* in Spanish, from the Arabic word *yxquerlat*, softened afterwards to *escarlata*; being the smallest species of oak, the same which Caspar Bauhine and other Botanists call *ilex aculeata cocci-glandifera*. §

This

§ According to Pliny, the term *cusculium* is derived from a Greek word, signifying to cut the excrescencies, as it happens on this occasion with respect to the kermes.

Clusius says, *Hispanis major frutex qui grandem fert carraasca dicitur, qui vero coccum gignit coscoxa*. Caroli Clusii rariorum aliquot stirpium per Hispanias observatarum historia, Antuerpiæ, 1576.

It is still called scarlet grain by the dyers, under the notion of being a grain of seed, though the very name in Arabic, signifies little worms.

Roderic, archbishop of Toledo, who finished his history of Spain in 1243, seems to have coined the latin word *scarlatum*, to express this colour. Tunc comes Petrus Asfurii indutus scarlato et insidens equo albo, &c. Rod. Toletani de rebus Hispanicis, lib. vii. cap. i.

This tree, whose height is about two or three feet, grows in Spain, Provence, Languedoc, and along the Mediterranean coast; also in Galatia, Armenia, Syria, and Persia, where it was first made use of. Dioscorides says it grows plentifully in Armenia, and without particularizing other places, mentions what grows there to be better than that of Spain, which proves its high estimation in those days; moreover confirmed by Pliny, who, speaking of that which grew near Merida, adds, “*Coccum Galaciæ rubens granum aut Circa Emeritam Lusitaniæ in maxima Laude est.*” Lib. 9. cap. 41. For which reason the Romans obliged the Spaniards, according to the same writer, to pay their tribute in this article. †

Joseph Moya, a Catalan writer of the last century, published a treatise entitled *Ramillet de Tinturas*, dedicated to the city of Barcelona, under the feigned name of Phesio Mayo. He says, the Kermes is common all over Spain, principally in that part of Aragon bordering on Catalonia, in Valencia, and in the bishopric of Badajoz in Estremadura, as likewise in Setimbre of Portugal, where it is the best, and equal to the kermes of Galatia and Armenia. Mr. Hellot of the French academy of sciences, in his Art of Dying, chap. 12. says it is found in the woods of Vauvert, Vendeman,

† Book 16. chap. 8.

deman, and Narbonne; but more abundantly in Spain, towards Alicant, and Valencia. It not only abounds in Valencia, but also in Murcia, Jaen, Cordova, Seville, Estremadura, la Mancha, Serranias de Cuenca, and other places.

In Xixona and Tierra de Relleu, there is a district, called De la Grana, where the people of Valencia first began to gather it, whose example was followed all over Spain. It has, some years, produced thirty thousand dollars (£5000--) to the inhabitants of Xixona. In the Year 1758, there went out of that town, Relleu, Buffot, Castilla, Ibi, Tibi, Unil, Santa faz, Muchiamel, and San Juan de la Huerta de Alicante, above a thousand persons to gather the kermes, which was afterwards sent to Alicant, where it was put into casks for exportation, being chiefly shipped for Genoa and Leghorn, passing from thence to Tunis. In the same year, 1758, they gathered about 300 arrobes of kermes at Xixona, which sold for about twenty-four dollars (£4--) the arrobe,† with about six per cent. duty and shipping charges, till on board. In the kingdom of Seville it is put up to public sale and is generally bought by the people of the neighbourhood, who sell it again for exportation to the merchants of Cadiz.

Both

† An arrobe is 25lb. Spanish weight; 100lb. Spanish equal to 97lb. English.

Both ancients and moderns seem to have had very confused notions concerning the origin and nature of the kermes; some considering it as a fruit, without a just knowledge of the tree which produced it; others taking it for an excrescence formed by the puncture of a particular fly, the same as the common gall observed upon oaks. Tournefort was of this number. Count Marfigli, and Dr. Nisole, a physician of Montpellier, made experiments and observations with a view of further discoveries, but did not perfectly succeed. Two other physicians at Aix, in Provence, Dr. Emeric and Dr. Garidel, applied themselves about the same time, and with greater success; having finally discovered that the kermes is in reality nothing else but the body of an insect transformed into a grain, berry or husk, according to the course of nature; whose history I shall now briefly relate:

The progress of this transformation must be considered at three different seasons. In the first stage, at the beginning of March, an animalcule, no larger than a grain of millet, scarce able to crawl, is perceived sticking to the branches of the tree, where it fixes itself, and soon becomes immoveable; at this period it grows the most, appears to swell and thrive with the sustenance it draws in by degrees: This state of rest seems to have deceived the curious observer, it then resembling

bling an excrescence of the bark; during this period of its growth, it appears to be covered with a down, extending over its whole frame, like a net, and adhering to the bark: its figure is convex, not unlike a small floe; in such parts as are not quite hidden by this soft garment, many bright specks are perceived of a gold colour, as well as stripes running across the body from one space to another.

At the second stage in April, its growth is completed, its shape is then round, and about the size of a pea: it has then acquired more strength, and its down is changed into dust, and seems to be nothing but a husk, or a capsule, full of a reddish juice not unlike discoloured blood.

Its third state is towards the end of May, a little sooner or later, according to the warmth of the climate. The husk appears replete with small eggs, less than the seed of a poppy. These are properly ranged under the belly of the insect, progressively placed in the nest of down, that covers its body, which it withdraws in proportion to the number of eggs: after this work is performed, it soon dies, though it still adheres to its position, rendering a further service to its progeny, and shielding them from the inclemency of the weather or the hostile attacks of an enemy. In a good season they multiply exceedingly, having from 1800 to 2000 eggs,

2000 eggs, which produce the same number of animalcules. The ancients knew them to be insects, for Pliny says, “*Coccum ilicis celerrime in vermiculum femutans.*” Lib. 24. sect. 4. When observed with the microscope in July or August, we find that what appeared as dust, are so many eggs, or open capsules, as white as snow, out of each of which, issues a gold coloured animalcule, of the shape of a cock-roche, with two horns, six feet, and a forked tail.

Mr. De Reaumur has placed the kermes in the class of gall insects, on account of the analogy in their mode of propagation, and immoveable form, continuing even after death, like the other species of this class, found upon different trees, appearing only like galls, or excrescences, to the most accurate naturalists: Therefore they could not be more properly named, than gall insects. There are of them of different shapes and sizes, but that of the *coscoxa* or *carrasca* (the kermes) is of a spherical figure, about the size of a juniper berry. It is found plentifully on the oldest and lowest trees, and when the kermes are gathered near the sea, they are larger and give a brighter colour than those in any other places.

There are several species of galls discovered on different trees, and plants of Spain, though they only make use of those gathered on oaks, either
for

for dying, or any other purposes; such are those, from the Levant called Aleppo galls, which were generally made use of, till it was discovered by frequent experiments, that the new ingredient called dividivi was preferable, being a fruit from the province of Carracas, and Maracaybo, in South America.

The great mystery which hitherto had not been discovered, by those naturalists who knew how to distinguish the gall insect, from the galls, was to vestigate their mode of propagation: Mr. de Reaumur assures us, that from frequent observations it appeared to him, that there are both male and female, but that some which are extremely small, transform themselves into gnats, while others, growing larger, deposit their eggs, without any transformation; from which, and their analogy with the others, he concluded, that the small gnats with wings, though large in comparison with their body, and striped with a beautiful crimson, were the males of the gall insect, which he observed with the help of a microscope, seeing how they fecundate the females, before they assume a globular form towards March; but this happens when it is scarcely ever noticed, and in so singular a manner, that a common observer would never imagine such an event to have happened, or, even suppose, that the males which he saw frisking about, had the least connection with the

the females; but on the contrary, were small gnats which accidentally light upon the same boughs; if to this observation we add, that as the new kermes which come forth in June, remain small without engaging our attention till March ensuing, when they begin to swell without any appearance of animal life, it will not be thought so extraordinary, that they have been generally held as a vegetable production. In Languedoc, and Provence, the poor are employed to gather the kermes, the women letting their nails grow for that purpose, in order to pick them off with greater facility.

The custom of lopping off the boughs is very injudicious, as by this means they destroy the the next year's harvest. Some women will gather two or three pounds a day, the great point being to know the places where they are most likely to be found in any quantity, and to gather them early with the morning dew, as the leaves are more pliable and tender at that time, than after they have been dried and parched by the rays of the sun: strong dews will occasionally make them fall from the trees sooner than usual: when the proper season passes, they fall off of themselves, and become food for birds, particularly doves. Sometimes there will be a second production, which is commonly of a less size with a fainter tinge. The first is generally found adhering

hering to the bark, as well as on the branches and stalks; the second is principally on the leaves, as the worms choose that part where the nutritious juice preserves itself the longest, is most abundant, and can be most easily devoured in the short time that remains of their existence, the bark being then drier and harder than the leaves.

Those who buy the kermes to send to foreign parts, spread it on linnen, taking care to sprinkle it with vinegar; to kill the worms that are within, which produces a red dust which in Spain is separated from the husk. Then they let it dry, passing it through a sarse, and make it up into bags. In the middle of each its proportion of red dust put in a little leather bag also belongs to the buyer, and then it is ready for exportation, being always in demand on the African coast.

The people of Hinojos, Bonares, Villalba, and other parts of the kingdom of Seville, dry it on mats in the sun, stirring it about, and separating the red dust, which is the finest part, and being mixed with vinegar, goes by the name of *Pastel*. The same is done with the husks; but these have but half the value of the dust.

There is no doubt, but if this branch of industry was more closely attended to, there is yet room for improvement, and the kermes would give a brighter colour, similar to that obtained from

from the cochineal, likewise an insect found in the Mexican woods on a plant called nopal by the Americans, and *tuna* by the Spaniards; being the *opuntia maxima folio obtuso rotundo* of Sir Hans Sloane, and the *cactus opuntia* Linneus.

It is remarked that those plants which are cultivated by art, give a much finer cochineal, known by the name of *mestica*, so called from the quantities collected of it in the district of Meteca, in province of Honduras.*

But neither the cochineal, the kermes, or any similar production, would afford that beautiful colour, were it not for the salts employed in the lye by the dyers, to bring it to perfection. Mr. Maquer in his art of dying silks, assures us, that the white tartar employed for crimson colours, gives by means of its acidity, that brilliancy to cochineal, and that though other acids might produce the same effect, it would not be with so much success. Mr. Goguet, in his "origin of laws, arts and sciences," tells us, the ancients used a great deal of salt, to make their dyes solid, and permanent, supplying the place of our chemical preparations by other secrets unknown to us. Plutarch, in the life of Alexander the Great, mentions, that conqueror having found in the
treas-

* See second memoir of Mr. de Reaumur, tom 4.

treasures of the king of Persia, a prodigious quantity of purple stuffs, which though they had lain by above one hundred and ninety years, still preserved their lustre, because they had been prepared with honey; behold, says Mr. Goquet, a secret unknown to us! but if we reflect for a moment, that honey is a vegetable salt, like sugar, we shall find it to be the same as tartar, which is no more than an essential salt of wine; so that the salts employed by the ancients, were equivalent to those used at present in the dye-house. Probably the salts of fruits have the same effect in the manner they are used in Persia for dying of silk, where, instead of tartar and honey, they use the pulp of red melons, well dried, mixed with allum, barrilla, and other salts.

The kermes of Spain is preferred on the coast of Barbary, on account of its goodness. The people of Tunis mix it with that of Tetuan, for dying those scarlet caps so much used in the Levant. The Tunisiens export every year above one hundred and fifty thousand dozen of these caps, which yields to the Dey a revenue of one hundred and fifty thousand hard dollars, (£33,750--) per annum for duties; so that, exclusive of the uses and advantages of kermes in medicine, it appears to be a very valuable branch of commerce in Spain, and there is still sufficient encouragement to use every effort for its improvement.

LETTER

L E T T E R IV.

The method of making Saltpetre in Spain.

IN the year 1754, I received orders * from the ministry to inspect into several saltpetre works, as well as into the making of gunpowder, which having complied with, the following reflections occurred to my mind.

All the professors of chemistry I had conversed with, either in France or in Germany, laid down as a fixed principle, that there are three mineral acids in nature: that the vitriolic, is the universal one, belonging to metals, from whence the other two arise. That the nitrous is second in activity, and belongs to the vegetable kingdom, and the marine being the weakest of all, is homogeneous to fish. They do not include the animal acid, which united with the phlogiston, § forms the phosphorus. I was further taught, that the fixed

D alkali

* Don Guillermo Bowles.

§ By phlogiston, chemists mean the most pure and simple inflammable principle, concerning which there are a great variety of opinions and doctrines, supported on the one hand, and controverted on the other with equal ingenuity, by chemical writers.

alkali of saltpetre, did not exist purely, and simply in nature, but was generated by fire, and when they found saltpetre, to be dug out of the earth naturally in the East Indies, they thought to save the difficulty, by saying it proceeded from the incineration of woods, which had impregnated the earth, with this fixed alkali, the basis of saltpetre; so that I had been led to believe, it was formed by certain combinations, that took place in the act of combustion; but I soon found my error, when I had seen the method of making saltpetre in the different provinces of Spain. I have now evident proofs that the basis of nitre really exists in the earth and in plants, the same as in the *Soda* of Alicant. Let these learned gentlemen come to Spain, they may convince themselves of this truth, and see saltpetre with its alkaline basis, in the manufactures of Castile, Aragon, Navarre, Valencia, Murcia, and Andalusia, where it is made without the assistance of vegetable matter; sometimes throwing in a handful of ashes of matweed, merely to filter the lye of earth, and though they often meet with gypseous stone in the neighbourhood of their works, yet they make excellent saltpetre by boiling the lixivium of their lands only, in which they do not find an atom of gypsum; consequently they have gunpowder in Spain, without being indebted for its fixed alkali, to the vegetable kingdom, and

and without the visible or sensible conversion of the vitriolic acid of gypsum into the nitrous.

Having thus discovered in Spain a perfect fixed alkali in the earth, I pursued my observations on other salts, and vegetable productions, and after many reflections and experiments, I discovered that similar fixed alkalies, many oils, and neutral salts, proceed from different combinations of the air, earth, and water, with such matters as the air conveys in a dissolved state, and that these three elements, rising, falling, and meeting, combine together, and form new bodies in the organs of vegetation.

Those who are versed in physics, agree, that all the substances of the very globe we inhabit, consist of the combinations of fire, water, earth, and air; why then deny them the power of combining, in the living organs of plants? when we so often perceive in them, the faculty of changing, and transforming productions in the kingdom of nature. In proof of it, we find that many cruciformed plants give by analysis, the same volatile alkali as animals, notwithstanding that their tubes are similar to the eye, with those that give acids.

Some plants have their roots so small, and yet their branches, leaves and fruit so ponderous, that it appears impossible, so inconsiderable a root

should draw sufficient nurture out of the earth for such various purposes. It seems therefore, that the ambient air, containing many dissolved bodies, penetrates into the plants, and combines in the vegetative tubes, forming those substances discovered by analysis.

I have frequently seen water melons in Spain weigh from twenty to thirty pounds, with a stem of only two or three ounces, so great was the increase of the fibrous and tubulous substance of those plants, owing to the watery particles they imbibed from the air. It should seem then, that many plants draw their principal support from the air, water, and a small portion of earth, combined by the imperceptible labour of the vegetative tubes, and vessels of air, which convert those matters into the products we contemplate, and taste; many plants producing all these effects in water only, and we find that mint, and other odoriferous plants whose roots grow in water, and in the air, give the same spiritus rector, and oils, as those that grow in the earth.

Botanists know very well that those aquatic plants that spring up from the bottom of waters have a very trifling deviation, the same properties and qualities in the frozen regions, as in sultry and parching climates, and, that their acrimony, causticity, insipidity, and coolness, are invariable.

The

The experiments made by Van Helmont on the willow tree, making it grow in water, and a small portion of dried earth, shew how much air, and water, added to the internal labour of plants, contribute to vegetation.

In the memoirs of the French academy of sciences, we find experiments of a celebrated chemist, to prove the existence of three neutral salts in the extract of borragé. If he had gone further, and proved that one of these three salts, existed in the earth, which produced the borragé, he would have illustrated the system of physics, and cleared up the point I am speaking of. The same memoirs mention another academician, who reared an oak for many years, only with water, the consequences of which speak for themselves.

There are millions of firs about Valladolid, and Tortosa, replete with turpentine, and growing in a small portion of earth, and great quantity of sand, in which it would be difficult to prove that the thousandth part of the turpentine, so plentifully produced by these trees, had existed; of course, it must be owing to channels of air, connected with the tubes of vegetation.

The conductory vessels of the wormwood of Granada, convey a bitterness to the very juice of the sugar cane, which grows by its side; the soil of the

the king's botanic garden at Madrid, is of one equal kind, for all the different plants that are reared there, yet some produce a wholesome fruit, while others near them, are poisonous; and one, with fixed alkali, will thrive close to another, full of volatile alkali. ‡

The mountains and vallies of Spain, as well as the gardens, are full of aromatic plants, yet I do not know that any body has ever extracted by analysis, any aromatic water, or volatile oil, from any uncultivated land.

The variation of soil, or culture, may alter the form of plants, change the lustre of their drapery, or give additional flavour to their fruit, but it can never change their essence, and nature. In proof of this, it is known, there is only one indigenous tulip in Europe, (I found it in flower near Almaden), it is small, yellow, and ugly, appearing only in the spring. Gardeners may invent modes of cultivation, try all the climates of Europe, they may produce larger tulips with brighter colours, but they all will be inodorous, and the little tulip of Spain, will give by analysis, the very same product

‡ Just as Shakespeare has emphatically said :

The strawberry grows underneath the nettle,
And wholesome berries, thrive and ripen best
Neighbour'd by fruits of baser quality.

Hen. 5th.

duct as the most superb of the east, whose beautiful garment in common with other gay flowers, is owing to the phlogiston in the organs of vegetation, and not to iron as has been thought. This phlogiston is manifest by analysis in the leaves, where the least atom of iron has never been discovered.

There are many lands in Spain which naturally produce salt-petre, sea-salt, and vitriolic salts; but the plants which grow spontaneously in those soils, give by analysis the same product as those of their species in gardens, where there never was any appearance of salt-petre, sea-salt, or vitriolic acid.

Analize as often as you please, those plants so numerous near iron mines, whose roots penetrate into the very ore, or those that grow in ferruginous and superficial earth. I am sure you will not collect from their roots, branches, ashes, extracts, or oils, more iron, than what is found in the same species of plants that spring up in places without the least communication with any such minerals.

Whatever efficacy there may be in culture, and manure, to remove, absorb, and open the pores of the earth, enriching the watery particles, that rise in the vegetative tubes, conveying new substances which contribute to that perfection, we observe, from the soil, and which they lose when transplanted,

planted, yet they still attain various substances of vegetation from the air, which chemists may look for in vain in the earth. *

Many plants are emollient in the spring and summer, and astringent in autumn and winter. Their mucilaginous quality admits of alteration in the tubes, and the combination of earth, air, and water, engenders a vitriolic acid †, just as the alkali and the leaves receive colour from the phlogiston; from whence I conceive the reason of the nitrous soil in Spain, abounding with such a prodigious quantity of fixed natural alkali; which calls to my mind what is fondly advanced by the adepts, "That some lands have the natural properties of loadstone to attract peculiar substances from the air."

It is certain then, that plants have proper tubes to attract the elements, and form a natural fixed alkali, and have peculiar separate principles which only combine by the means of fire in the act of combustion

* The ingenious author of this reasoning does not seem to be aware, that it would be equally fruitless to look for these substances in the water, or in the air. It is true that we cannot extract turpentine from the sand, or from the earth, in which the fir trees of Vallidolid and Tortosa grow; but it is equally true, that we cannot extract it either from the air, or from the water of those countries.

† The existence of vitriolic acid in vegetables has not yet been proved.

bustion to form that artificial fixed alkali I had been taught to believe was the only one that existed in nature.

Perhaps the soda and salicornia may thrive better when nurtured by salt water, but it is no less certain that the alkaline basis of common salt is found formed in these two plants, and in many others as well as in the barilla, which is sowed in many parts of Spain, where they make as good soap as that famous sort at Alicant made with soda and salicornia. With respect to neutral salts, there are at least five substances, in which they are found, viz. earth, plants, salt water, mineral, and artificial substances.

After this digression, let us now see how saltpetre is generally made in France and in Spain, I say nothing of England or Holland, because they make none, importing what they want from the East Indies, where it is found naturally in the earth, as in Spain, where I have seen saltpetre made with the lixivium of nitrous earth, collected in places where perhaps there never was a tree nor a plant.

In Paris they have seventeen saltpetre works: every thing that is carried on there, as well as in other parts of the kingdom, is done according to royal ordinances, in the manner I am going to relate:

relate: The rubbish and filth of old houses is carried to the works, and pounded with hammers; the dust is then put into casks, perforated at bottom, the aperture covered with straw, to give a free passage to the liquor. Water is then poured on this dust, which in its passage carries away all the saline matter. This impregnated matter is called a lye, which if they were at that period to boil, would produce saltpetre of a greasy nature; to remedy this, they purchase the ashes of all the wood fires in Paris, from which they also draw a lye that is mixed with the former, then boil up the whole.† In proportion as the water evaporates, the common salt which crystalizes when hot, soon falls to the bottom of the cauldron, and the saltpetre, which only crystalizes when cool, remains dissolved in the water. They draw off this water, loaded with saltpetre, into other vessels, and place it in the shade, where the nitre crystalizes. This is called saltpetre of the first boiling, having still some remains of common salt, earth, and greasy matter, incorporated with it; it is conveyed to the arsenal to be properly refined, being boiled over again, and left
to

† The fact seems to be this; the salt they obtain from the lye of the rubbish, is a nitre with an earthly basis, the fixed vegetable alkali procured from the wood ashes is then added; this alkali precipitates the earth from the nitrous acid, and taking its place, forms true saltpetre.

to crystalize two or three times, or more if found necessary; by which means it is cleared of all its impurities, and becomes perfectly adapted to the making of gunpowder and the other uses to which it is applied in the arts; but for medical purposes, it must undergo another purification. Those who are curious of being more exactly informed, may find a very accurate account of these works in the memoirs of the academy of sciences by Mr. Petit, to which I refer them.

In Spain, where a third part of all the lands, and the very dust on the roads in the eastern and southern parts of the kingdom, contain natural saltpetre, I have seen them prepare it in the following manner.

They plough the ground two or three times in winter, and spring, near the villages. In August they pile it up in heaps of twenty and thirty feet high: then fill with this earth a range of vessels, of a conic shape, perforated at bottom, observing to cover the aperture with matweed and a few ashes, two or three fingers deep, that the water may just filter through. They then pour on the water, (sometimes without putting any ashes); the lye that results from this operation is put into a boiler. The common salt, which as we said before precipitates, and crystalizes when warm, falls to the bottom of the cauldron in a proportion of
40lb. to

40lb. to a quintal of materials; † then the liquor is poured into buckets placed in the shade, where it shoots, and crystallizes into saltpetre. The great quantity of common salt which accompanies the nitre, makes me think, that the marine acid with its basis, is converted into nitre. The same earth, deprived of its nitrous quality by this process, is again carried back to the fields, and exposed to the elements, by which means, in the course of a twelvemonth, assisted by the all-powerful and invisible hand of nature, it again becomes impregnated with a fresh supply of nitre, and what is still more surprising, and cannot be observed without admiring the wonderful works of the omnipotent creator, the same lands have produced time immemorial an equal quantity of saltpetre; so that if the supreme power was to annihilate all the factitious saltpetre of France, and Germany, Spain alone could supply the rest of the world, without the aid of a fixed alkali, ashes or vegetables, if public œconomy joined hands with industry, and assisted in bringing these great points to perfection. I once asked one of these people the reason of that constant production of saltpetre, but his only answer was, “I have two fields, I sow one with corn, and have a
“crop,

† The Spanish quintal is 100lb. weight, and about 97lb. English. The arroba of Madrid is 25lb. Spanish, and four arrobes make one quintal.

“crop, I plough the other, and it furnishes me
“saltpetre.”

This saltpetre thus crystalized is similar to that of Paris of the first boiling. In Spain they only boil it once more, and it becomes perfect, and proper for making of gun-powder, aqua fortis, and other purposes of the shops. Its basis placed in a cellar, attracts the dampness of the air, loses its activity, and forms a fixed alkali, which mixed with the vitriolic acid, forms a vitriolated tartar, a certain proof that the nitrous air of Spain is natural and perfect in itself, without the assistance of any fixed alkali whatever. †

I shall not dwell upon the proportion of saltpetre, sulphur, and coal, used in the making of gunpowder; as it depends upon experience, and is generally known. I was present at the proofs made by the king's officers in Granada, to ascertain whether the powder had the qualities required, in order to be admitted or refused, but I do not think

† However incredible this account of Mr. Bowles may appear to an English chemist, it would be rather rash to deny the truth of it, particularly as he observes that the basis of the nitre thus produced is a fixed alkali, and united with the vitriolic acid, forms vitriolated tartar. But if there is no deception in the case, the spontaneous production of the vegetable fixed alkali in a place where no vegetables grow, is a fact altogether new, and worthy of a further examination.

think those proofs were to the purpose, as new made powder perhaps may throw a ball to the distance required; yet to form a true judgment of its real quality and goodness, it should be tried in different places and climates, and at various seasons of the year; for I am convinced that the gunpowder which would come up to the strength required by the king in the dry and warm climate of Andalusia, would be deficient in the damp and moist air of Galicia, which shews how little such experiments are to be depended upon. Of all the inventions I know of for this purpose, the least imperfect is that of Mr. Darcy, a design of which may be seen in the first volume of Mr. Beaume's treatise on chemistry.

When the Count de Aranda was director of the engineers, I remember an old officer of artillery informed me that in the last wars in Italy, he had seen barrels of gunpowder, that were good in the morning, and bad the next night: This did not surprize me, knowing the variations of weather, and the effects of dampness piercing through the casks and damaging the powder, so as to render it unfit for service, for which reason every precaution should be taken to guard against these inconveniencies. †

LETTER

† This is the substance of Mr. Bowles's discourse. Some observations of his relating to the qualities of salts are

L E T T E R V.

Of the Merino sheep.

THE wools of Spain form a considerable branch of our commerce with that country. It has even been said that their fine quality was originally owing to a few English sheep sent into Spain, as a present by our Henry the second, or according to others, by Edward the fourth, in 1465, but without entering into fruitless investigations of an event so remote, and of so little consequence, I shall confine myself to speak of those

are omitted, as those subjects are treated of with greater exactness by modern chemists, to which the reader is referred.

It is likewise unnecessary to expatiate upon, or point out the properest methods of preserving gunpowder, so well known in this country, and with respect to the force of fired gunpowder, a late publication gives us the most curious and ample information, viz. "The force of fired gunpowder and the initial velocity of cannon ball, determined by experiments, from which is also deducted the relation of the initial velocity, to the weight of the shot and quantity of powder. By Charles Hutton, master of the military academy of Woolwich, which gained the prize medal of the Royal Society." Phil. transact. for 1778, vol. lxxviii.

those remarkable sheep known in Spain by the name of *Ganado Merino*, “The Merino flocks,” and describe the constant method of conducting those numerous tribes from the northern to the southern provinces, to which they attribute that peculiar fine quality of the wool, which has rendered it so famous all over Europe. *

There are two sorts of sheep in Spain, some that have coarse wool, and are never removed out of the province to which they belong, and others, that after spending the summer in the northern mountains, descend in the winter to the milder provinces of Estremadura, and Andalusia, and are distributed into districts, which go by the name of *Merindades*. These are the Merino sheep, of which it is computed there are between four and five million in the kingdom. † The word Merino,

* Though this account of Spanish sheep appeared in the gentleman’s magazine for 1764, and in other publications, yet as I am informed it came originally from Mr. Bowles, I have again inserted the substance of his discourse, in justice to its original author, with some further illustrations relating to the wool of Spain, not mentioned by that writer.

	Sheep.
† The duke of Infantado’s flock about	40.000
Countess Campo de Alenfe Negretti	30.000
Paular, and Escorial convents, 30.000 each	60.000
Convent of Guadalupe	30.000
	Marquis

Merino, signifies a governor of a province. The Merino mayor is always a person of rank and appointed by the king. They have a separate jurisdiction over the flocks in Estremadura, which is called The *Mesta*, and there the king in person is Merino mayor. §

Each flock consists generally of ten thousand sheep, with a *Mayoral* or head shepherd, who must be an active man well versed in the nature of pasture, as well as the diseases incident to his flock.

E This

Marquis Perales	-	-	-	30.000
Duke of Bejar	-	-	-	30.000
Several flocks of about 20.000 each	-	-	-	200.000
All the other flocks in the kingdom together, on an average about	-	-	-	3.800.000
				<hr/> 4.220.000

In 1778, the wool of Infantado was 9285 arrobes in the grease, and Negretti nearly the same. Washed wool coarse and fine together, worth at an average, eight and a half rials vellon per lb. (about 2s) exclusive of duties which are 20 per cent. on exportation.

There is a curious discourse on the wools of Spain in the second volume of the Spanish correspondence of lord Sandwich, lord Sunderland, and sir William Godolphin, in a book entitled, *Hispania illustrata*. London, 1702.

§ There is a supreme council at Madrid called *Consejo de Mesta* which takes cognizance of all matters relating to sheep, wool, shepherds, pastures, woods, and all concerns that belong to royal seats and parks.

This person has under him fifty inferior shepherds, and as many dogs, five of each to a tribe. The principal shepherd has a hundred pistoles (about £75.) and a horse every year. The other servants have 150 rials for the first class (£1. 13s. 9d.) 100 rials for the second class (£1. 2s. 6d.) 60 rials for the third class (13s. 6d.) and 40 rials, or nine shillings for the other attendants. Each of these has an allowance of two pounds of bread a day, with the same quantity of an inferior sort for the dogs. They are likewise permitted to keep goats, and a few sheep, of which they have the meat, and the lambs, provided the wool remains for the master. They may do what they please with the milk, of which they seldom make any advantage. In the months of April and October, each shepherd has 12 rials given him (about 2s. 9d.) as a perquisite previous to his journey.

Though these flocks divide and separate themselves over several provinces of Spain, it will be unnecessary to relate what passes in each, their government being similar and uniform. The places where they are to be seen in the greatest numbers are in the Montana and Molina de Aragon in the summer, and in the province of Estremadura in the winter. Molina is to the eastward of Estremadura, the Montana is to the north, and the most elevated

elevated part of Spain; Estremadura abounds with aromatic plants, but the Montana is entirely without them.

The first care of the shepherd in coming to the spot where they are to spend the summer, is to give to the ewes as much salt as they will eat; for this purpose they are provided with 25 quintals of salt for every thousand head, which is consumed in less than five months; but they eat none on their journey, or in winter. The method of giving it to them is as follows. The shepherd places fifty or sixty flat stones about five steps distance from each other; he strews salt upon each stone, then leads his flock slowly through the stones, and every sheep eats at pleasure. This is frequently repeated, observing not to let them feed on those days in any spot where there is lime-stone. When they have eaten the salt, they are led to some argillaceous spots, where from the craving they have acquired, they devour every thing they meet with, and return again to the salt with redoubled ardour.*

E 2

At

* Mr. Bowles observes, that if the district is limy or marly, the sheep eat less salt in proportion to the lime they find, and asking the reason of one of the shepherds, was told, it proceeded from their grazing in cornfields, on which occasion the illiterate shepherd seemed to relate the fact though ignorant of the cause, which was, according to Mr. Bowles,

At the end of July each shepherd distributes the rams amongst the ewes, five or six rams being sufficient for an hundred ewes. These are taken out of flocks where they are kept apart, and after a proper time are again separated from the ewes.

The rams give a greater quantity of wool, though not so fine as the ewes, for the fleeces of the rams will weigh twenty-five pounds, and it requires five fleeces of the ewes to give the like weight. The disproportion in their age is known by their teeth, those of the rams not falling before the eighth year, while the ewes, from their delicacy of frame or other causes, lose theirs after five years.

About the middle of September they are marked, which is done by rubbing their loins with ocre diluted in water; some say this earth incorporates with the grease of the wool, and forms a kind of varnish, which protects them from the inclemencies of the weather; others pretend that the pressure of the ocre keeps the wool short, and prevents it

Bowles, "from the salt all limy matter abounds with, and partaken of by cattle, either in licking the stones, or communicated by vegetation to grass; for which reason, their appetite is not so keen for any salt that is offered them:" however we cannot admit this to be the true cause, as chemists are now well assured that lime does not contain any salt whatever.

it from becoming of an ordinary quality ; others again imagine, that the ocre acts in the nature of an absorbent, and sucks up the excess of transpiration, which would render the wool ordinary and coarse.

Towards the end of September these Merino flocks begin their march to a warmer climate ; the whole of their route has been regulated by the laws and customs, time immemorial. They have a free passage through pastures, and commons belonging to villages, but as they must go over such cultivated lands as lie in their way, the inhabitants are obliged to leave them an opening ninety paces wide, through which these flocks are obliged to pass rapidly, going sometimes six or seven leagues a day, in order to reach open spots less inconvenient, where they may find good pasture, and enjoy some repose. In such open places they seldom exceed two leagues a day, following the shepherd and grazing as they move on. Their whole journey from the Montana, to the interior parts of Estremadura, may be about one hundred and fifty leagues, which they perform in about forty days.

The first care of the shepherd is to lead them to the same pasture where they have been the winter before, and where the greatest part of them were reared ; this is no difficult task, for if they
were

were not led there, they will discover the ground, by the great sensibility of their olfactory organs, to be different from that which is contiguous; or were the shepherds so inclined, they would find it no easy matter to make them go further. The next business is to order the folds, which are made by fixing stakes, fastened with ropes one to the other, to prevent their escape, and being devoured by the wolves, for which purpose the dogs are stationed without. The shepherds build themselves huts with stakes and boughs, for the raising of which as well as for fuel, they are allowed to lop off a branch from every tree. This law is the cause of so many trees being rotten and hollow, which grow in those places frequented by these flocks.

A little before the ewes arrive at their winter quarters, it is the time of their eaning, at which period the shepherds must be particularly careful. The barren ones are separated from the others, and placed in a less advantageous spot, reserving the best pasture for those that are fruitful, removing them in proportion to their forwardness: the last lambs are put into the richest pasture, that they may improve the sooner, and acquire sufficient strength to perform the journey, along with the early ones.

In

In March the shepherds have four different operations to perform with the lambs, that were reared in the winter; the first is to cut off their tails, five fingers below the rump for cleanliness; the second is to mark them on the nose with a hot iron; next they saw off the tips of their horns, that they may not hurt one another in their frolics; finally they castrate such lambs as are doomed for bell-wethers, to walk at the head of the tribe; which is not done by any incision, but merely by squeezing the scrotum with the hand, till the spermatic vessels are twisted like a rope, and decay without further danger.

In April the time comes for their return to the Montana, which the flock expresses with great eagerness, by various movements and restlessness, for which reason the shepherds must be very watchful, lest they make their escape, which often happens when proper care is not taken, and whole flocks have sometimes strayed two or three leagues while the shepherd was asleep, as on these occasions they generally take the straightest road to the place which they came from.

The first of May they begin to shear, unless the weather is unfavourable; for the fleeces being piled one above the other, would ferment in case of dampness, and rot; to avoid which, the sheep are kept in covered places to shear them more conveniently;

veniently ; for this purpose they have buildings that will hold twenty thousand at a time, which is the more necessary, as the ewes are so delicate, that if immediately after shearing they were exposed to the chilling air of the night, they would certainly perish.

One hundred and fifty men are employed to shear each thousand sheep. Each person is reckoned to shear eight sheep a day, but if rams, only five, not merely on account of their bulk, and greater quantity of wool, but from their fickleness of temper, and difficulty to keep them quiet, the ram being so exasperated, that he is ready to strangle himself, when he finds he is tied ; to avoid which, they endeavour by fair means and caresses to keep him in temper, and with much soothing, and having ewes near him, they at last engage him to stand quiet, and voluntarily suffer them to proceed.

On the shearing days the ewes are shut up in a large court, and from thence conducted into a sudatory, which is a narrow place, where they are kept as close as possible, that they may perspire freely, in order to soften the wool, and make it yield with more ease to the shears. This is particularly useful with respect to the rams, whose wool is more stubborn. The fleece is divided into three sorts ; the back, and belly, give the superfine, the neck

neck and sides give the fine, and the breasts, shoulders and thighs, give the coarse wool.

The sheep are then brought into another place and marked, examining those without teeth, which are destined for the slaughter-house; the healthy are led to graze, if the weather permits, if not, they are kept within doors, till by degrees they are accustomed to the air. When they are permitted to graze without being hurried, they select and prefer the finest grass, never touching the aromatic plants, though they find them in plenty, and if the wild thyme is entangled with the grass they separate it with great dexterity, avoiding it on every occasion, moving eagerly to such spots as they can find that are without it.

When the shepherd thinks there is a likelihood of rain, he makes proper signals to the dogs to collect the flock, and leads them towards shelter; on these occasions the sheep not having time to choose their pasture, pick up every thing they meet, thyme, rosemary, and every herb indiscriminately, even poisonous ones; such as henbane, poppy, and hemlock, particularly soon after they are sheared. Were they to take a fancy and give a preference to aromatic plants, it would be a great misfortune to the owners of beehives, as they would destroy the food of the bees, and occasion a disappointment in the honey and wax. They are never suffered to move out of their folds till the beams

beams of the sun have exhaled the night dews, nor do they let them drink out of brooks, or standing waters, where hail has fallen, experience having taught them, that on such occasions they are in danger of losing them all. The wool of Andalusia is coarse, because their sheep never change climate like the Merino flocks, whose wool would likewise degenerate, if they were kept at home; and that of Andalusia would improve, were they accustomed to emigrate.

Between fifty and sixty thousand bags of washed wool are annually exported out of Spain. A bag generally weighs eight arrobes or 194 pounds English. About twenty thousand bags of this wool are sent annually to London and Bristol worth from £30. to £35. each; so that we have one third of the produce, and of the best sort. The wool of Poular, which is the largest, though not the best, is reserved for the king of Spain's manufactures. The common and shooting dresses of the royal family of Spain and their attendants, are made of the cloth of Segovia, from whence our English nobility, in Henry the VIIIth's time, were supplied with fine cloth.*

The crown of Spain receives annually, by all duties together on exported wool, near sixty millions of reals vellon per annum. (£675,000.)

LETTER

* Breadth of cloth made at Segovia, 1 3-4ths *vara*, or 57 3-4ths inches English.

L E T T E R VI.

Inconveniencies arising from the emigrations of the Merino sheep, and the partial laws of the Mesta.

YOU desire my opinion † concerning the Mesta, but I have nothing to add to what I have frequently mentioned to you, on a subject not easily reduced into the compass of a letter; however I shall once more lay before you those observations that have engaged me to entertain the notions I have formed to myself concerning the Mesta.

This appellation has corruptly crept into our language, and been applied to sheep, when in reality it had no other signification, than a mixture of grain, and feed, such as barley, beans, oats, lentils, &c. nor was any such name as the Mesta flocks known in Spain before the days of king Alfonso El

† This letter was written by the late ingenious Padre Sarmiento, to Don Antonio Ponz, and is dated Madrid, 12th Sept. 1765, and published by Ponz, in his eighth volume of Viage de Espana, Madrid, 1778. It shews how far the spirit of improvement has extended, and reached even within the gloomy walls of convents, and as it gives a lively idea of the spirit of the times, I thought it would perhaps be more acceptable to preserve it in its original form.

El Ultimo, when English sheep were first brought into Spain in the Spanish caracks. It was then that the office of judge of the Mesta had its rise according to the Bachelor Fernan Gomez de Ciudad Real, in his 73d epistle. The aforesaid king Alfonso introduced these foreign valuable sheep called Marinas, and not Merinas, according to the vulgar opinion; in the same manner as his present majesty, Charles the third, has lately introduced at the Casa del Campo,* some goats from Angora, so valued for their hair of a fine white, almost like silk, the breed of which might easily be propagated, as the district they come from, is in a parallel latitude with Spain.

A few years after this event relating to the English sheep, our kingdom was desolated by an universal pestilence, which in 1348 ruined Spain and part of Asia; and in 1350 carried off king Alfonso. The dominions of Spain suffered infinitely on this dismal occasion, inasmuch that since the universal deluge, there is no instance of an equal calamity, for it wasted the country, and swept away two-thirds of the inhabitants. Spain became depopulated, and husbandry seemed to be lost. The many rural churches in the centre of the kingdom, are proofs of this terrible havock, that ruined whole villages, of which *Etiam periere ruinae*. Thus
four

* A royal feat near Madrid.

four or five villages, perhaps of two hundred families, were destroyed, and the country changed into a swamp or heath, open to any invader, and free to the first comer, who was willing to take possession. The whole territory was afterwards claimed by the adjacent more fortunate villages, from whence we may account for the present amazing jurisdiction of some villages, which includes a space of fourteen leagues in circumference; inasmuch that in places where before this fatal event, there were three or four populous parishes, there is now only one lonely parish thinly inhabited by people in distress; others were totally destroyed, nothing remaining but the steeples which are called rural churches.

These churches, or at least these steeples, seem still to be crying out like Æacus in Ovid to Jove his fire, on a similar event, "*Aut mihi redde meos, aut me quoque conde Sepulchro.*" The doleful condition of these miserable wretches will strictly bear the comparison. The pestilence it is true lasted only a few years, but their misery has continued above four centuries.

It is to this calamitous time we must attribute the origin of the Mesta. The English sheep were first brought into the mountains of Segovia, without the least idea of the Mesta or of Estremadura. It was the great space of uncultivated land and
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the want of husbandmen, that encouraged both shepherds and cattle to stray beyond their boundaries, and to wander into districts where no impediments occurred to their progress, making a casual use of the lands without the least thought of proper cultivation, as that would require more hands than they were able to furnish; and on this occasion they first introduced that barbarous method of ploughing with mules, by which they only just scratched up the ground.

Thus what was so imperfectly tilled, and much more left entirely uncultivated, remained for the purpose of grazing for foreign cattle, to the great prejudice of agriculture. Estremadura is a province of Leon, and not of Castile; the natural remedy for these misfortunes was immediately perceived by the Portuguese, though the Castilians would not understand it, some being warped by their avarice, under a fond notion of having large tracts of land although barren, and others by the flattering idea of possessing numerous flocks, as if agriculture had been lost. The laws therefore that were made by Ferdinand King of Portugal deserve to be written in letters of gold, one of which was; "That no person who was not an husbandman or his servant, should keep sheep either for himself, or for others; and if any other persons were desirous of having them, they must oblige

oblige themselves to cultivate a certain portion of land, under the penalty of losing their cattle if the regulation was not exactly complied with." By this singular and most excellent law, many defects of the *Mesta* could be remedied, both in respect to the sheep, and the shepherds, who without cultivating a foot of land usurped so considerable a district, in a manner so prejudicial, to the industry of the farmer.

It is shameful to observe in Spain, a continuation of the barbarous customs of the Saracens, who totally neglectful of agriculture, wander with their cattle over the depopulated plains of Arabia and Lybia. When the industrious Moors possessed *Estremadura*, they turned the whole province into a garden, replete with inhabitants, as appears by the numerous armies they brought into the field against the Christians. They did not send their flocks to Castile, nor the Spaniards come with theirs into *Estremadura*, for the *Mesta* was unknown.

This expression therefore is not circumscribed to the sole mixture, or variety of cultivation, but comprehends grazing, united with farming, since the practice of both properly combined, constitutes the true farmer, who without some cattle, will ever be poor. The method observed by the Romans, in allotting a certain number of head of cattle

cattle of the larger and smaller fort, in proportion to a given quantity of land, evinces the propriety of similar laws in Portugal, as well as the indispensable connection of these branches of rural œconomy.

Some perhaps will not believe, that the depopulation of Spain proceeds from the Mesta, as there are waste provinces to be found where the Mesta is unknown. But I must answer them in general terms, that where there is no Mesta, every part is populous, as for instance, Galicia, Asturias, the Montana, and Biscay; to which may be added, Navarre, Catalonia, and Valencia. The Mesta not only depopulates Estremadura, but also the kingdoms of Leon, and Castile, where the sheep destroy the country in their passage, preventing the farmers from inclosing their lands, according to their natural rights, as well as the civil and national laws, which permit those inclosures where happily the Mesta does not prevail.

To return to the state of population. The Roman empire, according to Riciolus, was supposed to contain four hundred and ten millions of people. In the days of Tertullian not a foot of land was uncultivated. Solinus says of Spain, "*nihil otiosum, nihil sterile est.*" Estremadura contains two thousand square leagues of land. The most moderate calculation admits of a thousand persons to
each

each square league; then Estremadura would admit of two millions of inhabitants, which allowing four persons to a family, would make five hundred thousand families; but Ustariz* only allows to Estremadura sixty thousand families; and the number is now thought to be less. Consider then the disproportion, and what prejudice the country receives from the Mesta. Galicia, where there is no Mesta, and only sixteen hundred square leagues, has above a million of inhabitants. So much concerning population, the life of a state, when idleness is banished, and industry encouraged. With respect to cattle, Galicia has more than Estremadura. Ustariz says that about four millions of sheep go into Estremadura: In Galicia they have not flocks of thirty and forty thousand head, possessed by one person contributing nothing towards agriculture; he that has forty or fifty sheep is a Cræsus, but the poorest of farmers have at least five and twenty head of different kinds. Few reflect, that in a state, a great many small portions are of much more consequence than a few large divisions, though consisting of infinite numbers.

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Other

* *Theoria y practica de commercio y marina*, por Don Geronimo de Ustariz, Madrid, 1742. This curious book has been translated into English. See Ustariz's theory and practice of commerce, by Kippax. London, 1751.

Othher advocates for the Mesta extol the value of the wool, and tell us it is an active commerce, but Ustariz shews, that foreigners only pay us at par, for the wool in the fleece, and have a profit of four to one in vending their manufactures. The way to form an active commerce of our wool, and our silk, of which we have such plenty, would be to work it ourselves, and prohibit all foreign importations.

The culture of silk is of no prejudice to agriculture like the Mesta; a manufacture of silk would be of more advantage to Estremadura, than all the flocks of the Mesta together. Ustariz computes the Mesta to employ forty thousand people, destined by nature for agriculture; therefore, as each person could till land enough to produce 50 fanegas of corn,* would they not be better employed in raising two millions of fanegas of corn, either at home or in Estremadura, than in leading such a wandering life in idleness and poverty? In Galicia they are not burthened with such swarms of vagabond strollers with their dogs, nor are they pestered with wolves; one little girl while she is spinning can overlook the domestic œconomy, and have an eye to the whole flock of the

* Fanega is a corn measure in Spain, five of which make an English quarter of eight bushels.

the family, when the plains of Estremadura are ravaged and laid waste by the locust. Ask these partisans of the Mesta, whether their sheep ever go into battle, or render any public service to their country? I know you have read the memorial of complaints made by the province of Estremadura against the Mesta; though they still suffer this inconvenience in the interior parts of the kingdom, they ought to be more cautious on the frontiers towards Portugal, to prevent bad consequences in case of a sudden invasion. I should be glad to know how many head of cattle are maintained in Madrid, for I know their provision is not brought from the mountains, or pastures, but from cultivated plains. Finally, I shall always be of opinion that except some spots reserved for the royal chace, and the diversion of our sovereigns and their illustrious line, all the rest should be cultivated, as in the days of Tertullian, that each farmer should inclose his lands, and that the same should be allotted to them for tillage, in proportion to their abilities, allowing a certain number of cattle, corresponding to the extent of the farm. Then, for the greater advancement of agriculture, the cultivators of land should form a body politic, with power to enact wholesome laws, and regulations, for the encouragement

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and

and benefit of husbandry. The Mesta people did so, and had a confirmation of their laws from Charles 5th, in 1544, but with this condition, of their not being prejudicial to a third person. Let Estremadura answer, whether this is the case? and let the farmers then give their opinions. But I must insist with Solinus, that in Spain, no part where there is a possibility of avoiding it, should remain *otiosum neque sterile*. *

L E T T E R VII.

Miscellaneous observations made at Madrid, with some account of the royal cabinet of Natural History.

THE town of Madrid is now become the capital of the monarchs of Spain, situated in the center of their dominions, and from one of the fil-
thiest

* Ever since the accession of the house of Bourbon to the throne of Spain, the extension of commerce, and the improvement of agriculture have been primary objects. The Real Junta de Comercio, or Board of Trade, was first erected by Philip the 5th, on the 15th of May, 1707. Many new regulations have been made for the benefit of commerce and agriculture, since his present majesty's arrival from Naples at Madrid, which was on the 9th of December 1759. For the greater encouragement of agriculture

thiest places imaginable, is at present on a par for cleanliness with several principal cities of Europe, being likewise well paved and lighted, but in respect to population, it is far inferior to London, Paris,

culture, all the old laws relative to corn were repealed in 1765, and the embarrassments with which they were clogged totally removed: new laws more favourable to industry, were enacted, and a spirit of freedom and liberty introduced in the commerce of grain, in order to give every encouragement to the farmer. To improve the minds of the people, Academies were erected in Madrid, Valladolid, Seville, Valencia, and Barcelona, besides many literary societies in different parts of the kingdom, particularly one at Madrid, with the noblest of titles "Los Amigos del país," The Friends of their country, in which every subject is to be considered, tending to the advancement of arts, manufactures, and commerce; and the better to convey these ideas to the public, the art of printing has been particularly attended to, and brought to very great perfection: however as all these literary establishments are still in their infancy, time only will discover their intended effects. The new roads through the kingdom form a principal branch of modern improvement, and for the better completing the same, they have been again put under the direction of the general post office, by a royal decree of the 8th October, 1778, with new revenues assigned for the purpose; but with respect to the want of inns, and conveniences for travellers, Don Antonio Ponz, in his last volume insists, that every thing that has, or can be said, on the subject, is still short of the truth. "La verdad es, que en quanto a la penuria que se padece en esta materia, qual-

Paris, or Naples.* Madrid is in a high situation, all the rivers and brooks in its neighbourhood fall into the Tagus, whose waters roll down to the ocean. The Guadarama mountains, to the north west of the town, are covered with snow several months of the year, which added to the piercing north winds, that reign in the winter, renders it excessively cold, while in summer the southern and westerly blasts are generally attended with

qualquiera se quedara corto por mucho que diga." *Viage de Espana*, tom. 8. folio 212. Madrid 1778.

* The following table was published at Madrid for the year 1778, will shew the present state of population in that town.

Parishes.	Marriages.	Births.	Deaths.
St. Mary	13	41	28
St. Martin	343	930	338
St. Gines	74	308	108
St. Lewis	107	239	79
St. Joseph	114	212	121
St. Nicholas	7	12	15
St. Saviour	9	11	15
St. John	2	17	15
Holy Cross	86	208	108
St. Peter	13	30	24
St. Andrew	108	341	109
St. Michael	18	87	50
St. Just	213	723	248
St. Sebastian	341	801	277
St. Iago	18	71	42
	<hr/> 1466	<hr/> 4031	<hr/> 1577
			There

with dampness and rain. Travellers have told us, the air is so subtle that if a dead dog was thrown into the streets over night, he would not have a bit of flesh on his bones in the morning, but this is a fable, as it is a known fact, that dead dogs and cats lie in the streets continually, as well as dead mules, close to the road side, for days together, without any such effect.

Historians relate that King John 2d being in Madrid, in 1434, it began to rain and snow on the 29th of October, and never ceased till the 7th January following, insomuch that several houses were destroyed, and the inhabitants reduced to the greatest distress for want of provisions; a report having been spread that the King intended to alienate the town, the inhabitants petitioned the King not to desert them, which finally terminated in a royal edict of the 30th of May 1442, by which it was ordained that neither the town or its jurisdiction, could ever be alienated.

The

There died this year in the parishes and in the three hospitals 3483 persons, without reckoning infants, and those who died in communities, nunneries, and the other hospitals of the court; and there have been 4372 births, including the foundlings baptized in St. Gines.

This year 611 infants have been brought to the royal foundation of *La Inclusa* for foundlings, of which 341 have been baptized in the parish of St. Gines. *Kalendario manual, y Guia de forasteros en Madrid para el ano de 1778.*

The principal streets of Madrid are paved with cut flint, the others with pebbles, found in the neighbourhood, the cut flint on account of its sharpness is very inconvenient to foot passengers, and the flat pavement near the houses is too narrow. The town is well supplied with water, and there are conduits in the principal streets; that called *del burro*, in the neighbourhood of the town is constantly drank by the royal family wherever they are. The bread is white and good, and when the barrenness of the country all around is considered, the *plaza mayor* or principal square, where the market is kept, is extremely well supplied with all manner of provisions.

Mr. Bowles has observed that if that celebrated professor Mr. Henckel, had come to Madrid, he would soon have been convinced of his error, in saying that "flint was not to be found in strata and only in detached lumps, or in masses, for here he would find all the environs replete with strata of flint; and moreover not a house or a building, but what has been constructed with lime made from flint,* which serves also for fire arms,

* It is allowed that nature by some process unknown to us, seems to change limestone into flint, but this change once made, we cannot by calcination, or any other known means,

arms, as well as for the pavement. In some places pieces are found of it full of a species of agate, streaked with red, blue, white, green, and black, that take a very good polish, but these colours are accidental, and disappear by calcination. No acid will dissolve it, or cause any effervescence; when calcined, it burns in the water with more violence than true limestone, and mixed with the pebble or coarse sand near Madrid, makes an excellent material for building, though it does not answer so well with the fine sand of the river. It is impossible to fuse this flint alone, or any other found in limy or argillaceous earths, no more than the different kinds of agates, cornelians and
rock

means convert flint into lime: it is true that flint may be calcined, and then it loses its flinty appearance, becomes white and may by a superficial observer be mistaken for lime, but it will not unite with an acid, it will not dissolve in water, it will not make a cement; in short it does not possess any of the distinguishing properties of lime. There are in this island beds of limestone stratified with layers of flint, and it is probably the case with these hills near Madrid; so that they get flint and limestone from the same quarry.

I am indebted to an ingenious friend since my return to England for this observation, and as I had not an opportunity of ascertaining the point to satisfaction with respect to those places near Madrid, I have related the circumstance as stated by Mr. Bowles, with hopes that some future traveller in Spain may be inclined to examine that ground more minutely.

rock crystal, but they calcine by themselves; that is, are turned into lime and fuse very well mixed with fixed alkali of *Barilla*, or with lead, the easiest to fuse of all metals, and change into the English flint glass, which is by far the best hitherto known. Many naturalists, according to Mr. Bowles have followed this erroneous opinion respecting flint, and amongst the rest Mr. de Reaumur. Linneus in his *Systema Naturæ*, says, "*Silex nascitur in montium cretaceorum rimis, uti quarzum in rimis Saxorum*," but we have only to open our eyes, to be fully convinced of the fallacy of this assertion, when we contemplate the numerous beds of flint near Madrid, and in different parts of Spain, and Italy, separated from all cretaceous matter. The abate Fortis, in his late travels into Dalmatia, found the flint there, quite different from the descriptions of former naturalists, and adds, "I have often seen the flint in the very act as I may say of passing from the calcareous state to the siliceous, and particularly I have often found flint enveloped in volcanic matter. I have formed a series of these progresses, which I have shewn to some of my friends."*

In the environs of Madrid there are above two hundred villages, but few can be seen on account of

* Travels into Dalmatia by the abate Fortis, translated into English. London, 1778.

of the inequality of the ground, the country being broken up by continual gullies, and various changes of aspect, occasioned by torrents, and other casual accidents, in a country little cultivated, and abandoned to every vicissitude of season. Near the town they chiefly sow barley, and here and there have some trifling vineyards. Their tillage is much the same as in Old Castile, that is, just to scratch up the earth and scatter the seed at random, then to cover it over with a similar indifference, and wait for the coming of the poor labourers from Galicia, to get in their harvest. The farmers pretend that if they were to make use of a stronger plough, they should have less corn. Mr. Bowles next reproaches the Spaniards for passing over in silence their countryman Don Joseph Lucadelo, a gentleman of Aragon, who had invented a curious plough much esteemed by foreign nations, who had taken the merit of the invention to themselves, suppressing the name of the ingenious Spaniard; but this person, whose name was Joseph Lucatelli, was a native of Carinthia, one of the provinces of the house of Austria, who having made his experiments before the emperor Leopold in 1663, at the castle of Laxemberg, near Vienna, obtained a certificate of its utility from the imperial court, and then came to that of Madrid, and performed other experiments equally successful at the Buen Retiro, in the presence of Philip

Philip the 4th, from whom he obtained an exclusive patent for the sole vending of his plough for 24 reals plate in Europe, (about 11s.) and 32 reals plate (about 14s. 6d.) in America, of which a printed account was published by Lucatelli, at Seville, in 1664. A model of this plough was sent by Lord Sandwich, then ambassador at Madrid, to John Evelyn, Esq; who presented it to the royal society, with a letter describing its use, which was inserted in the philosophical transactions of the 23d of February, 1669-70, and the model deposited in Gresham college.

Nothing can be more bleak and dismal than the general aspect of the country round the seat of its monarch, with a great want of trees, to which the Castilians have such a dislike, from a false notion that they increase the number of birds to eat up their corn; as if this reason would not hold good in other countries, where shade is not so necessary, as it is in Castile, to support the moisture of the soil; or that it was ever an objection in Valencia, a kingdom so fertile and wooded: the Castilians not reflecting, that the seeds of plants, and leaves of trees, afford nurture for insects, and birds, and prevent them from destroying the grain as they do in Castile, for want of other food; besides the advantage of screening the earth in hot weather, and preserving a due moisture

ture after dews and rain ; for without their aid, the scorching beams of the sun parch up the earth, and render it unfruitful ; so that what little comes up is devoured by birds, in a climate where nature seems to have designed it should be otherwise ; for the climate of Madrid is not in itself adverse to the propagation of trees, as may be seen by the public walks, and modern improvements and plantations. The old historians speak particularly of the woods, and of their advantageous situation for forest beasts, as appears from a book written by king Alfonso el ultimo, called *Libro de Monteria del Rey Don Alonso*, in which that monarch extols the country near Madrid, for its shady situation and extensive woods, well adapted for hunting the stag, wild boar, and even of bears. †

I shall

† *Libro de Monteria* por G. Argote de Molina 1582. This curious book was drawn up by the particular command of King Alfonso ; Argote de Molina being only the editor. It contains three books, and is very serviceable for the right understanding the geography of Castile, and Leon in those days. Besides particular directions for breaking of dogs, and training them properly, there is a circumstantial detail of the various woods, and situations, proper for venary, and forest beasts, understood under the title of *Monteria*, such as the bear, stag, wolf, and wild boar, which sport was the delight of Spanish princes, while they disregarded the beasts of the chase, such as the buck, fox, marten, and hare. His present Catholic majesty takes great pleasure in shooting wolves and wild cats.

I shall not particularize the various improvements that have taken place of late years; however the new regulations and extension of commerce with their American colonies, are worthy of notice, particularly the open and free trade with each other granted in 1764, to the provinces of Peru, New Spain, Guatimala, and kingdom of Granada, in America. In order to render this plan more compleat and facilitate the intercourse with Europe, eight packet boats for conveying letters were built at Coruna, one to sail the first day of every month, with a mail for the Havana. Accordingly the first packet named the *Cortes*, sailed for the Havana the 1st of November, 1764. Five packet boats were established to sail from the Havana to Vera Cruz, from whence a post road was made as far as Mexico, with its necessary branches, and communications, with the different provinces; so that letters come every month from those distant places, and often sooner, than from European courts. At Porto Rico, four galliots were established for the correspondence of Terra Firma, and Peru, receiving the letters brought by the Coruna packet boats, and bringing back the answers, by which means they receive letters from Carthagená, and Santa Fe, as quickly as by the Havana. Two galliots were likewise stationed at Carthagená, for the correspondence between Porto Bello and Panama.

To

To extend this advantage further to the southward, six packet boats were appointed in 1767, to sail from Coruna to the river of Plate, and city of Buenos Ayres, from whence six expresses were to proceed annually with the letters for Peru and Chili, and other provinces of those extensive dominions; all which has been conducted with so much activity and spirit, that communications have been opened over the famous *Cordillera* of Chili, between that kingdom and Peru, and a regular post for letters kept up, in the most remote jurisdictions; where, before that period, even the very idea or name of a post-office was unknown. For the conducting of which, the general post-office have 25 vessels; viz. 14 from the Coruna to the Havana, Montevideo and Buenos Ayres; 5 from the Havana, to Vera Cruz; 4 from Porto Rico to Carthagena; and 2 from Carthagena to Porto Bello.

The Royal Cabinet of natural history, at Madrid, was opened to the public by his majesty's orders in 1775; a handsome house having been purchased, of which the first floor was appropriated for the royal academy of San Fernando, and the second for the purpose of receiving an ample collection of natural curiosities, which had been collected in Paris by Don Pedro Davila * a native of Peru, which his majesty has accepted of, and appointed,

* See catalogue des curiosités du cabinet de Davila. 3 tomes, avec figures. Paris, 1767.

pointed him director thereof; and was also at the charge of bringing them from Paris. Every thing is ranged with neatness and elegance, and the apartments are opened twice a week for the public, besides being shewn privately to strangers of rank.

The collection of beasts and birds, at present is not large, but may be supposed to improve apace, if they take care to get the productions of their American colonies. They have the skeleton of an elephant that died lately at Madrid; also a little American ox stuffed, called Zebu, by Mr. de Buffon, and Zebulo by the Spaniards. The great Ant bear from Buenos Ayres, the *Myrmecophaga Jubata* of Linneus, called by the Spaniards *Osa Palmera*, was alive at Madrid in 1776, and is now stuffed and preserved in this cabinet. The people who brought it from Buenos Ayres, say, it differs from the ant-eater, which only feeds on emmets and other insects; whereas this would eat flesh, when cut in small pieces, to the amount of four or five pounds. From the snout to the extremity of the tail this animal is two yards in length, and his height is about two feet. The head very narrow, the nose long, and slender. The tongue is so singular, that it looks more like a worm, and extends above sixteen inches. His body is covered with long hair, of a dark brown, with white stripes on the shoulders; and when he sleeps he covers his body with his tail.

The



Osa Calmeca. Mylodonphaga Tubata. Lynx.
THE GREAT ANT BEAR — from BUENOS AYRES.

The mineral part of the cabinet, containing precious stones, marbles, ores, &c. is very perfect. Amongst other curiosities they have a grain of gold of 22 carats, which weighed sixteen marks, four ounces, four ochavos, Spanish weight, found in California, and sent by the viceroy of Mexico as a present worthy of his majesty's acceptance; † also several curious specimens of silver ore, from the Guadalcanal mine in Estremadura, of that sort called *Rosicler*.

Specimens of Mexican and Peruvian utensils, vases, &c. in earthenware of that kind, which the Spaniards call *Barra*, wretched both in taste and execution. Some productions likewise of Otaheite, which the Spaniards call *amath*.

A curious collection of vases, basons, ewers, cups, plates, and ornamental pieces of the finest agates, amethysts, rock crystals, &c. mounted in gold, and enamel, set with cameos, intaglios, &c. in an elegant taste, and the most delicate workmanship, said to have been brought from France by Philip the fifth. There is likewise a valuable

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† A curious treatise, now very scarce, was published at Mexico, by the viceroy, in June 1771, intitled *Noticia Breve de la Expedicion Militar de Sonor y Cinaleo, su Exito feliz y ventajoso estado, en que por consecuencia de ello se ha puesto ambas provincias*. See a further account of this expedition in Robertson's history of America. Note LXV. vol. 2.

luable collection of books and prints daily adding to the cabinet by the said Don Pedro Davila.

Were painting and sculpture my objects, this would be the place to describe the many fine pictures in the royal palace and in the noblemen's houses at Madrid; but I pass them over in silence the more readily, as modern travellers have described the most beautiful of these pictures. I shall just observe that a late writer who spent some time at Madrid, speaking of the church of the visitation, called *Las Salesas*, where the late king Ferdinand and his queen are interred, tells us, that at the principal altar, there is a fine copy of Raphael's transfiguration; whereas it happens to be a good picture of the visitation, in allusion to the name of the church, and done by Fransisco de Muro at Naples. It is true a most excellent copy of Raphael's transfiguration may be seen at another church belonging to the convent of St. Teresa, placed there by the founder, the Prince de Astilana, who considered it as an original of Raphael, and valued it at ten thousand pistoles (about £7000). It is supposed to have been done by Julio Romano, the ablest and favourite scholar of Raphael. The same writer speaking of the pictures in the palace of Buen Retiro in the saloon, named *De los Reynos*, calls one picture "Santa Cruz succouring Geneva;" whereas it is the surrender of Genoa to that officer, being placed
amongst

amongst other historical pieces of the times, which are termed by him, "Scripture subjects of the old testament.

That beautiful equestrian statue of Philip the 4th, by Tacca of Florence, which stands in a little flower garden of the Retiro, is worthy of the highest admiration. The attitude of the horse is surprisingly bold, with both his fore feet in the air; and was imitated from a picture of Velasquez, sent to Italy for that purpose. When seen by the Florentine artists, they all agreed it was impossible to execute it; however Tacca with the assistance of Galileo happily applied the principles of equilibrium, and succeeded beyond expectation. This unfortunate artist died soon after of grief from the treatment he received from the grand duke's minister, concerning this statue, but his eldest son Ferdinand came to Madrid, and fixed the parts together, which were three in number, and placed the statue properly. Six hundred and fifty six quintals of 128lb. of metal each, were employed in the casting. Its height, including the pedestal, is 84 palmos (19 feet 9 inches English). † In an inventory of the effects of the Retiro, it was valued at forty thousand pistoles (£.28.000) an enormous sum, and much more than it could ever have cost. It was proposed a

G 2

few

† A Spanish palmo eight inches and a quarter.

few years ago to remove this statue to some more conspicuous place, but it is said to have been objected to, by the then prime minister Marquis de Grimaldi, alledging that they must not pay any attention to the house of Austria, but he would have no objection if the head of Philip could be changed, for that of Charles the third.

Tacca also finished the equestrian statue of Philip the third in the Casa del Campo, left imperfect by John de Bologna, at his death, and was brought to Madrid in 1616, by Antonio Guidi, brother in law to Tacca, attended by Andrew Tacca, another brother of the sculptor, who brought with him the gilt metal crucifix fixed on the altar of the Pantheon at the escurial. The mention of the Retiro has naturally led me into the agreeable gardens of that palace, and to the menagerie, where, amongst other curiosities, they have a crested falcon from the Carraccas. This curious bird, which is about the size of a turkey, raises his feathers on his head in the form of a crest, and has a hooked bill; the lower mandible rather straight; his back, wings, and throat are black, the belly white, the tail distinguished by four cinereous, and parallel stripes, and is an undescript bird not taken notice of by Linneus.

LETTER



The CRESTED - FALCON from the *CARRACCAS*,
alive in 1778, in the Menagerie of Buen Retiro, at Madrid.

L E T T E R VIII.

Description of the palace and gardens of Aranjuez.

THE royal seat of Aranjuez, seven leagues distant from Madrid, and to which a most noble road has lately been made, is delightfully situated at the conflux of the rivers Tagus and Jarama; which run through the gardens, and add new beauty to this charming spot, where art and nature seem to go hand in hand with the most pleasing and rural simplicity. On one side, fine avenues of stately oaks and lofty elms, convey the truest ideas of magnificence, while they afford the most reviving shade; on the other, the sudden transitions to lawns and winderness, the cascades of water breaking through the thickets, the tuneful songs of numberless birds, sheltered in these cool recesses, the occasional appearance and passage of the monarch, attended by the grandees of his kingdom; all these objects united, and concentrated in one point, fill the imagination with pleasing ideas, and impress the mind of a traveller with a thousand agreeable sensations, particularly in the spring, when every thing is in high bloom and perfection, and engage him to look at Aranjuez as one of the most beautiful places in Europe.

The

The whole of these gardens may be thrown into three grand divisions, distinguished by the names of *La Huerta Valenciana*, † *Los Deleites*, and *El Cortijo*. In the Huerta Valenciana, agriculture and gardening are carried on in the same manner as in that fruitful province, and they plough with horses. In the Cortijo they use oxen, as in Andalusia; and in other places they scratch up the ground with mules as is still practised in some parts of Spain. Which ever way one looks round, a constant variety pleases the eye and enraptures the mind. At one moment the sturdy buffalo moves before you, drawing his heavy burthen; soon after, the slow camel with his ponderous load; while the swift Zebra with his striped garment frisks over the plains. If you approach the farm, every object of convenience is consulted, and in the dairy every degree of neatness. The Dutch cow enjoys a luxuriant pasture, the brood mares greatly enliven the landscape, and the stables are filled with the most excellent horses. An immense nursery furnishes all manner of trees and plants, a cedar of Libanus, which about twenty years ago was only a twig, is now thirty feet

† By the term of Huerta is understood that kind of inclosure we call an orchard, but with a greater variety of cultivation. When they speak of an ornamented flower garden near a palace or nobleman's house, the Spanish term is *jardin*, the same as in French.

feet high: the garden called the *Isla* is particularly beautiful and rural. The Judas tree, which the Spaniards call *Arbol de Amor*, being happily dispersed there, has a very good effect early in the spring, when covered with flowers without a single leaf; the banks of the *Isla* are further enlivened by elegant yachts, for the amusement of the royal family. The fine avenue which also serves for a public walk, called *Calle de la Reyna* has nothing equal to it at Versailles. The extensive flower garden on one side, renders the walk extremely pleasant in an evening; and were I to mention the quantities of flowers and fruit, it would require many details. A great many elms and oaks have been planted this year, (1778) said to be 101,000, which must likewise include vines, olives, shrubs, &c. They have lately begun to cultivate pine apples, unknown in every other part of the kingdom.

At the noon-tide hour, when the freshness of the morning is past, the shady walks near the palace then become an object of singular luxury, as well as the elegant fountains, whose sportive waters give such a coolness to the air. Whoever has enjoyed the agreeable moments that pass in pleasing converse under these shady bowers, will surely be charmed with their admirable effect, independent of every idea of modern improvements, or criticism upon fountains and water works.

works. The nightingale and cuckow are heard here the latter end of April. That elegant bird the bee eater, called by the Spaniards *Abejaruxo*, the merops apiaster of Linnæus, which our travellers tell us comes no further South than Andalusia, is known not only to breed at Aranjuez and live there all the year round, but is also found at St. Ildefonso, which is 20 leagues more to the northward. The golden thrush is also seen here, a beautiful bird with a bright yellow plumage, the icterus of Edwards, called *oropendulo* by the Spaniards, and *l'auriot* by the French, the oriolus of Catesby and Linnæus. Amidst the great variety of birds in these woods, there is one about the size of a cuckow, called *Pito*, of a beautiful purple. Such a diversity of objects could not fail to excite the genius and fire of the Spanish writers; for my part I willingly join with that elegant poet Don Gomez de Zapia, who has so naturally described them, in a poem, of which the following lines are the beginning:

En lo mejor de la felice España
Do el Rio Tajo tertia su corrida,
Y con sus cristalinas aguas bana
La tierra, entre las tierras escojida,
Esta una Vega de belleza estraña!
Toda de verde yerba entretejida,
Donde natura y arte en competencia,
Lo ultimo pusieron de potencia. §

The

§ Parnasso Espanol, Tom. 3. Madrid 1773.

The Palace being an old building with several additions is more in the style of a hunting seat, as Philip the second designed it, than of a royal mansion, nor is there any thing very particular in the apartments, to take off from the enjoyment of so many fine objects abroad. The new wings to the Palace are finished; in one is a play house, and in the other a chapel. Part of the cieling of the former was painted by Mengs, who is now (1779) at Rome painting a holy family for the principal altar in the chapel.

There are seven fine pictures of Luca Jordano in the apartment called *El Cabinete Antiguo*, and six others in that *de los Mayordomos*; particularly one, is universally admired, in which a number of beasts are represented listening to Orpheus, and seeming to be struck with the melody of his lyre. The portraits of the grand Duke and Dutchess of Tuscany by Mengs, are in a new apartment called the king's dressing room. In the chapel, over the great altar there is a fine picture of the Annunciation by Titian, presented by him to Charles the fifth, and brought from the convent of Juste after the death of that Emperor. The Porcelain Cabinet where there are several large pieces of the king's own Manufactory, is also an object of curiosity to a traveller. In a word, this charming place is highly indebted to Charles the third for bringing

bringing the whole to its present state of beauty, and making the new road from Madrid, and the noble stone bridge over the Jarama: if the design is continued of planting trees on each side of the road, it will add greatly to its magnificence.

A topographical plan of Aranjuez and the improvements there, has been executed by Don Domingo de Aguirre, captain of engineers, in sixteen sheets, and the views in eight more. In short, these rural places have so many charms, that they cannot fail of pleasing every fancy, and meeting universal acceptance, as Lupercio Leonardo de Argensola has happily expressed it, in a little poem in praise of these gardens.

Qualquiera aqui su condicion aplica,
Aunque su origen trayga de otra parte,
Do el sol menos, o mas se comunica!

But this is only to be understood with respect to the proper season of the year, suited to its situation, for as it lies in a bottom surrounded with mountains, the air is of course confined, which added to the great quantity of water, and numerous plantations, makes it agreeable when the hot weather begins, for which reason the court generally removes about the end of May, and goes soon after to St. Ildefonso, which is a very high situation among the mountains of Guadarrama, where
they

they begin a new spring and breathe a clear refreshing air during the scorching heats of summer.

Great quantities of liquorice grow wild near the road between Aranjuez and Toledo, as well as on the banks of the Tagus, where one also finds some curious reeds made use of by the Romans for writing, and celebrated by Martial, in an epigram addressed to Macer, who had been pretor in Spain.

Nos Celtas, Macer, et truces Iberos,
Cum desiderio tui petemus,
Sed quocumque tamen feretur, illic
Piscoli Calamo Tagi, notata
Macrum, pagina nostra nominabit, Lib. x.

The castle of Aceca dependent on the jurisdiction of Aranjuez though kept in good order, is more taken notice of on account of its former reputation, and antiquity, than from any other circumstance. Its district is supposed to have belonged formerly to a colony of Jews from Toledo, and so named from *azeba* in Palestine peopled by Joshua. † There is no doubt that the Jews were in great repute in Spain in the early ages, insomuch that in 686, under the gothic king Ervigius, they had the boldness to assert, and endeavoured to persuade the king, that the Messiah was not come. Their descendants several years afterwards propagated

† Kings. Book i. chap. 17.

gated fables, to prove their great antiquity in Spain, and in order to lessen the reproaches thrown on them by the Spaniards, they gave out, that they were not descended from those Jews who crucified our Saviour.*

LETTER

* Sandoval, bishop of Pamplona, relates, that when king Alfonso conquered the city of Toledo, he found it full of Jews, who shewed to that monarch two letters in Hebrew and Arabic, sent from the synagogue of Jerusalem to that of Toledo, giving them an account of Jesus Christ, and asking their opinion whether they should put him to death; also the answer of the Toledo Jews, dissuading them from it. These letters were ordered to be translated from Hebrew into Arabic by Galifre king of Toledo, and into Latin and Spanish by king Alfonso, and were preserved in the archives of Toledo till 1494. They were translated by Julian, archpriest of St. Just, and were afterwards in several hands. The answer of the Spanish Jews is dated Toledo 14th of the month Nisan, æra of Christ 18, and of Augustus Octavianus 71. I know nothing further concerning the authenticity of this letter, says the bishop of Pamplona, than that it was found in the archives of Toledo, and in the same style and language in which I have given it. *Historia de los Reyes de Castilla y Leon por Don fr. Prudencio de Sandoval obispo de Pamplona. En Pamplona 1615.*

L E T T E R IX.

Description of the baths and mineral waters of Trillo.

NO country abounds so much as Spain with hot baths and most excellent mineral waters, and they are now beginning to investigate their qualities. Those of Trillo have of late particularly engaged the attention of government, and we have been more accurately informed of their virtues and properties. The village of Trillo, in New Castile, is seventeen leagues from Madrid, by the new road lately made to that place, situated on the north banks of the Tagus, two leagues south of the city of Sigüenza. The village of La Puerta is about a league to the eastward, and the town of Gualda much about the same distance to the westward. The country is hilly, and affords little corn or fruit, some few vineyards, and plenty of game. The Tagus abounds in fish, such as trout, eels, and barbel; has a stone bridge of one arch over it, of a solid structure, and considerable antiquity, being there when the first investigations were made about this place in 1558.†

A little

† Particular mention is made of Trillo by Ambrosio Morales. Antiquedades de las Ciudades de España. Alcaza de Henares, 1575.

A little river runs from Cifuentes, which enters the Tagus at Trillo, and was once famous for its curious water mills, for sawing of timber brought down by the stream, which was the chief branch of industry of the inhabitants; but in the year 1710, on the 30th of December, they were visited by 1400 of the English army then serving in Spain, in favour of the archduke of Austria, who having staid there seven days, raised considerable contributions, and were succeeded by 8000 Portuguese their allies, under the Count de Atalaya, who ravaged the country, and pillaged the place: of the three saw mills, only one was left standing, which has since become useless. The inhabitants dwindled in numbers, and the few that remained, from a state of affluence and ease, experienced the extremity of poverty and distress; though in a situation, where the climate is remarkably temperate, the air pure, provisions plentiful, their mutton singularly excellent, and a fine spring of soft water runs near the village.

The baths are up the river on the opposite side of the Tagus, about the distance of a mile, with an agreeable road to them, made from the foot of the bridge, with an avenue of trees, through a pleasant district, well shaded with wood, where the warbling of nightingales, and the musical notes of various other song birds, delight the invalid, and welcome his approach to these salutary baths.

baths. Inns are now building for the reception of company, and every effort is made for the convenience of the infirm. The waters have been analyzed with exactness, a deputation having been appointed by command of the king, to conduct every thing with the utmost formality, under the direction of Don Miguel Maria de Nava, Dean of the council and chamber of Castile, assisted by Dr. Casimir Ortega, F. R. S. and royal professor of Botany at Madrid, who has published the proceedings of this assembly held at Trillo; and from his elegant treatise I have selected the following information. *

These baths are situated at a small distance from the banks of the river, in a meadow, at the brow of a hill, which by its situation to the eastward, affords a refreshing shade the greater part of the morning. The baths are divided in the following manner.

Los

* Tratado de las Aguas Termales de Trillo escrito de orden del Rey por el Dr. Casimiro Ortega, Madrid, 1778. The ingenious and learned Dr. Ortega was in England a few years ago, and is well known to several gentlemen in this country. Besides the waters of Trillo, those of Ribas, at a small distance from the mountain of Nuestra Senora de Nuria, near the Pyrenees of Cataluna, are greatly resorted to in the spring, and autumn, for gravelly complaints, as is also the fountain of Paterna, in the Alpujarra mountains of Granada, called "*Aguas agrias*," "*Acidulous waters*."

Los Quatro Banos, called the king's bath, divided into four separate baths, all equally commodious, and handsome, with their proper appertenances.

The Countess's Bath, so named after the lady of the Count de Cifuentes, who is lord of the place, is close to the river, but judiciously built and remarkably solid, to resist every impulse of the stream, and equally decorated with every convenience and advantage.

The bath of the *Piscina* is about four hundred paces from the king's bath, and has acquired this appellation from being chiefly made use of, by the poor, who are most subject to cutaneous complaints, for which purpose this bath is remarkably efficacious. A dwelling-house is now building for the use of the bathers, with every distribution of apartments and convenience, requisite for a place of this nature: also, for a greater embellishment of the baths, they have planted round them that beautiful and odoriferous tree sent thither from the royal botanic garden at Madrid, by the name of *robinia pseudo acacia*. In Spanish *falso aromo*. (The false acacia.)

Dr. Ortega, after referring us to Macquer, and other eminent chemists, who all agree, that the analysis of waters, is the most difficult operation of chemistry, as it tends to discover that union,
which

which nature by flow and secret steps, forms in water, and other substances, in its most occult and abstruse motions; proceeds to his analysis of the waters of Trillo, after some strictures and criticisms on the writings of Dr. Limon Montero, on the mineral waters of Spain, published at the close of the last century, intitled "Espejo Cristalino de todas las Aguas Minerales de España." And after denying them any nitrous, aluminous, or sulphureous qualities, as asserted by Dr. Limon, he closes his analysis with the following corollary:

"That these waters participate of five substances, two volatile, and three fixed; viz. a phlogistic vapour, extremely anodyne, penetrating, and friendly to the nervous system; of a moderate quantity of gas, calcareous earth, common salt, and felenetic salt; and that to each pound of water of sixteen ounces, one may calculate twenty-five grains and an half, of fixed principle. This computation was made on a considerable evaporation of water, of about a quintal,† which was judged to be the best method, as less liable to error, than those experiments with small quantities. It was also considered, that of the twenty-five grains and an half, of fixed principle, corresponding to each pound of mineral water, near fourteen grains are common salt, about three of

H felenetic

† A Spanish quintal 97 pound English.

selenetic salt, and about eight and an half, of absorbent earth; which for greater exactness we shall express in this manner :

13 $\frac{327}{1000}$ grains common salt.

2 $\frac{85}{1000}$ grains selenetic salt.

8 $\frac{327}{1000}$ grains absorbent earth.

The same proportions, with a very trifling deviation, were also found by Don Manuel Joachim Enriquez de Paiva, royal demonstrator of the chemical laboratory at Coimbra in Portugal.

Dr. Ortega observes, that the lightness of this water is so great, as even to enter into competition with that of distilled water, the purest we know of; therefore its effects will be the more easily accounted for: that the heat of the water, does not equal that of the blood, in a person in good health, and comes near to that tepid degree, prescribed by the physicians in artificial baths.

The bath of the princess is the most efficacious, or at least abounds most with phlogiston, and of course is better suited to those disorders where the efficacy of this principle is desired. The king's bath, and that of the countess have scarcely any phlogistic vapour, which variety makes them still more pleasing to the bathers, and applicable to different complaints; while the Piscina bath abounds chiefly with phlogiston, and is admirably suited to the disorders of the poor, as already ob-

served : finally the two principles of gas, and of phlogiston, are of so volatile a nature in these waters, that a remarkable difference is observed betwixt the well, and the bath, by those who drink them immediately from the spring, or at a distance ; which shews how much it evaporates by carriage ; for which reason it should not be filled in earthen pitchers, but only in bottles or flasks, well corked, and carefully sealed. This is the substance of a public oration pronounced by Dr. Ortega, before a numerous assembly at Trillo, and afterwards published by authority of the council at Castile, in virtue of their decree for that purpose, bearing date the 11th of April 1778, to which are added a few trifling cases, with that of the dean of the council, Don Miguel Maria de Nava, at the head of them, who found great benefit from these waters, and presided at this pompous assembly, attended by the Count de Cifuentes, a grandee of Spain, and many other noblemen and gentlemen of rank, as well as several eminent physicians, surgeons, and apothecaries, who all concur in the praises of Trillo, and set their names to the facts there related.

I shall only select one case, inserted by Dr. Ortega, and taken by him verbatim from Dr. Mendoza, physician at Cifuentes, written at Trillo so early as the 18th of July, 1714, adorned with a

copper-plate, representing the virgin Mary as protectress of the waters, being one of the first cures, which brought them into repute.

“ A friar of the congregation of St. Philip De
 “ Neri, was troubled with ulcers in his legs, the
 “ remains of a malignant erysipelas, and an abscess
 “ in the bone of the right clavicle, which
 “ having been opened by the person who attended
 “ him, terminated after a long and painful process,
 “ in a fistula. An ill-conditioned abscess of a great
 “ size, was discovered at the same time, situated
 “ on the last right rib, which was deemed very
 “ dangerous to open. He had also a tumour
 “ seated in the right axilla, another on the left
 “ hand, and others on the shoulders, a pain in the
 “ side, a hectic fever, shortness of breath, painful
 “ respiration, and a fallow complexion, with constant
 “ faintings and vapours, which flew to the
 “ head, and often occasioned a syncope. Having
 “ suffered thus, for two years, and all the remedies
 “ having failed, which are called human, he came
 “ to Trillo, drank the waters, used the baths, and
 “ voided a great deal of sand. The ulcers being
 “ healed, though for some time the hectic did not
 “ subside, he returned the following season to repeat
 “ the use of the waters and baths; and was
 “ perfectly cured, so as to go home without a
 “ fistula, tumours, or pain in the side; his respiration
 “ recovered, with a healthy and florid complexion;

“ plexion; and finally with so much natural vigour, that even the issues which he had been advised to have made, could not be kept open, notwithstanding every endeavour for that purpose. The witnesses of this case were Dr. Aquerenza, Dr. Porras, and the king’s first surgeon Monsieur Legendre.”

I now close this narrative with a list of such plants as Dr. Ortega tells us he found in the environs of Trillo. †

A CER Monspeſſu- *Montpelier maple*
lanum

Achillea ageratum Sweet *maudlin milfoil*

* *Achillea millefolium* *Milfoil yarrow*

* *Adiantum capillus ve-* *True maiden hair*
neris

* *Agrimonia eupatorium* *Common agrimony*

* *Agrostemma githago* *Corn cockle*

Allium descendens - - *Garlic*

Allium victorales *Broad leaved garlic*

Allium paniculatum - - -

Alfine

† Those marked with an asterisk are likewise natives of this country, the English names of which are adopted from “A Botanical arrangement of all the vegetables naturally growing in Great-Britain, with descriptions of their genera and species, according to the system of the celebrated Linnæus, &c.” By William Withering, M. D. Birmingham, 1776.

<i>Alfina fegetalis</i>	<i>Corn chick weed</i>
<i>Althæa cannabina</i>	<i>Hemp leaved marsh mallow</i>
* <i>Althæa officinalis</i>	<i>Common marsh mallow</i>
<i>Alyssum saxatile</i>	<i>Yellow mountain madwort</i>
<i>Anagallis monelli</i>	<i>Blue flowered Pimpernel</i>
<i>Androsace maxima</i>	<i>Androsace with the largest empalement</i>
<i>Anemone hepatica</i>	<i>Single hepatica</i>
* <i>Anthyllis vulneraria</i>	<i>Double beaded ladies finger</i>
<i>Antirrhinum bellidifolium</i>	<i>Daisie leaved snap dragon</i>
<i>Antirrhinum junceum</i>	<i>Rush leaved snap dragon</i>
* <i>Antirrhinum majus</i>	<i>Snap dragon toad flax</i>
<i>Antirrhinum saxatile</i>	<i>Snap dragon</i>
<i>Aphyllanthes Monspeliensis</i>	- - -
<i>Apium petroelinum</i>	<i>Common parsley</i>
* <i>Aquilegia vulgaris</i>	<i>Common columbine</i>
* <i>Arbutus uva ursi</i>	<i>Perennial leaved strawberry tree</i>
<i>Aristologia longa</i>	<i>Long birthwort</i>
<i>Aristologia pistolochia</i>	<i>Scallop leaved birthwort</i>
<i>Asclepias nigra</i>	<i>Black swallow wort</i>
* <i>Asparagus sativa officinalis</i>	<i>Cultivated sparagus</i>
<i>Asparagus silvestris</i>	<i>Wild sparagus</i>
* <i>Asperugo procumbens</i>	<i>Goosegrafs madwort</i>
* <i>Asperula cynanchica</i>	<i>Squinancy woodroof</i>
* <i>Asplenium ceterach</i>	<i>Common spleenwort</i>
	* <i>Asplenium</i>

- * *Asplenium rutamuraria* *White spleenwort*
- * *Asplenium trichomanes* *Green spleenwort*
- Atractyllis cancellata* - - *Distaff thistle*
- * *Bellis perennis* *Common daisy*
- Berberis dumetorum* - - *Barberry*
- Biscutella didyma* *Buckler mustard with a double orbicular pod*
- * *Borrago officinalis* *Common borrag*
- * *Bryonia alba* *White briony*
- Buplevrum frutiscens* *Shrubby thorough wax*
- Buplevrum rigidum* - - *Hare's ear*
- * *Buplevrum rotundi folium* *Round leaved thorough wax*
- * *Buplevrum tenuissimum* *Fine leaved thorough wax*
- * *Buxus sempervirens* *Tree box*
- * *Campanula rapunculus* *Rampion bell flower*
- Campanula stricta* *Bell flower with a stalk branching at the bottom*
- Catananche coerulea* *Blue candy lion's foot*
- Caucalis grandiflora* *Bastard parsley*
- * *Centaurea calcitrapa* *Starry knapweed*
- * *Centaurea cyanus* *Blue bottle knapweed*
- * *Centaurea nigra* *Black knapweed*
- Cheiranthus tristis* *Stock gilly flower*
- * *Chenopodium murale* *Sow bane bite*
- * *Chlora perfoliata* *Yellow centaury*
- * *Chrysanthemum leucanthemum* *Daisy goldins*
- * *Cichorium*

* Cichorium intybus	Wild endive
* Conium maculatum	Spotted hemlock
Cistus albidus	- - Cistus
Cistus incanus	Honey leaved cistus
Cistus fumana	- - -
* Cistus marifolius	Hoary cistus
Cistus populifolius	Poplar leaved cistus
Cistus umbellatus	- - -
Clematis viorna	Virgin's bower
Cleonia Lusitancia	- - -
Colutea arborefcens	Common bladder fena
* Convallaria polygona-	Odoriferous bellwort
tum	
Convolvulus terrestris	Bindweed
Coris Monspellienfis	Montpelier coris. We have no Englifh name for this plant.
Coronilla coronata	Jointed bodied coluthea
Coronilla juncea	- - Coluthea
Cotyledon Hispanica	- - -
Croton tinctorium	- - -
Cynogloffum cherifolium	- - -
* Cynogloffum officinale	Stinking bound's tongue
Cytifus argenteus	Low filvery cytifus
* Daphne Thymelæa	Spurge laurel, or mezereon
* Dacus carota filveftris	Wild carrot
* Daucus vifnaga	- - -
Dictamnus albus	White fraxinella
Digitalis obfcura	- - Foxglove
	* Dipafcus

* <i>Dipsacus filvestris</i>	<i>Clothiers teazle</i>
<i>Echinops sphaerocephalus</i>	<i>Greater globe thistle</i>
* <i>Echium vulgare</i>	<i>Common vipergrass</i>
<i>Ephedra destachia</i>	<i>Shrubby horsetail</i>
* <i>Epilobium hirsutum</i>	<i>Hairy willow herb</i>
* <i>Equisetum fluviatile</i>	<i>River horsetail</i>
* <i>Equisetum palustre</i>	<i>Marsh horsetail</i>
<i>Erigeron tuberosum</i>	- - -
* <i>Erysimum Barbarea</i>	<i>Rocket wormseed</i>
* <i>Euphorbia characius</i>	<i>Red spurge</i>
<i>Ficus carica</i>	<i>Figtree</i>
* <i>Fraxinus excelsior</i>	<i>Common ash</i>
<i>Fumaria enneaphylla</i>	<i>Nineleaved fumitory</i>
* <i>Fumaria officinalis</i>	<i>Common fumitory</i>
* <i>Gallium uliginosum</i>	<i>Marsh goosegrass</i>
* <i>Gallium aparine</i>	<i>Cleaver's goosegrass</i>
* <i>Gentiana centaurium</i>	<i>Centaurry gentian</i>
* <i>Geranium cicutarium</i>	<i>Hemlock leaved cranesbill</i>
* <i>Geranium sanguineum</i>	<i>Bloody cranesbill</i>
<i>Geum montanum</i>	<i>Mountain avens</i>
* <i>Geum urbanum</i>	<i>Avens bennet</i>
<i>Globularia spinosa</i>	- - -
* <i>Glechoma hederacea</i>	<i>Groundivy gill</i>
<i>Glycyrrhiza glabra</i>	<i>Smooth liquorice</i>
* <i>Gnaphalium luteo al- bum</i>	<i>Jersey cudweed</i>

* *Hedra*

106 TRAVELS THROUGH SPAIN.

* Hedera helix	Common ivy
Hedysarum humile	- - -
Heliotrophium vulgare	Common turnsol
* Herniaria hirsuta	Rough rupture wort
Hieracium multicaule	- - Hawkweed
Hieracium murorum	Golden hawkweed
* Hieracium pilosella	Mouse ear hawkweed
* Hippocrenis comosa	Tufted horse shoe
Hyssopus officinalis	Common hyssop
* Humulus lupulus	Brewer's hop
Illecebrum paronychia	Spanish knot grass
Inula montana	Mountain elecampane
Inula oculus christi	- - Elecampane
* Iris pseudoacorus	Yellow flag
Jasminum fruticans	Shrubby yellow jessamine
Juglans regia	Wallnut
* Juncus acutus	Marine rush
Juniperus oxycedrus	Great Spanish juniper
Juniperus Phœnicia	Phœnician juniper
* Juniperus communis	Common juniper
Lavandula spica	Spike lavender
* Lepidium latifolium	Pepper ditander
Lepidium nasturtium	- - ditander
aquaticum	
* Ligustrum vulgare	Common privet
Linum gallicum	- - flax
Linum narbonense	- - flax
	Linum

<i>Linum saffruticosum</i>	<i>Shrubby flax</i>
<i>Lithospermum fruticosum</i>	<i>Shrubby gromwell</i>
<i>Lonicera caprifolium</i>	<i>White honeysuckle</i>
<i>Lotus dorycinium</i>	- - <i>Bird'sfoot trefoil</i>
<i>Lotus filiquosus</i>	- - -
<i>Lotus tetragonolobus</i>	- - -
<i>Lyfimachia ephemereum</i>	- - <i>Loose strife</i>
* <i>Lyfimachia vulgaris</i>	<i>Yellow loose strife</i>
<i>Malva sylvestris</i>	<i>Common Mails</i>
<i>Malva tounefortiana</i>	- - -
<i>Medicago polymorpha orbicularis</i>	- - -
* <i>Mentha aquatica</i>	<i>Water mint</i>
* <i>Mercurialis annua</i>	<i>French mercury</i>
<i>Mercurialis tomentosa</i>	<i>Woolly mercury</i>
<i>Mespilus amelanchier</i>	<i>Alpine vespillus</i>
<i>Nigella arvensis</i>	- - <i>Fennel flower</i>
* <i>Oenanthe fistulosa</i>	<i>Water dropwort</i>
<i>Olea Europaea</i>	<i>Olive</i>
<i>Ononis mitissima</i>	<i>Smooth restbarrow</i>
<i>Ononis natrix</i>	<i>Yellow restbarrow</i>
* <i>Ononis spinosa</i>	<i>Thorny restbarrow</i>
<i>Ononis tridentata</i>	<i>Three thorned restbarrow</i>
<i>Ononis viscosa</i>	<i>Clammy restbarrow</i>
* <i>Ophrys spiralis</i>	<i>Triple twaye blador</i>
	* <i>Origanum</i>

108 TRAVELS THROUGH SPAIN.

* Origanum vulgare	<i>Wild marjoram</i>
* Orobanche major	<i>Great broom rape</i>
* Papaver rhæas	<i>Corn poppy</i>
* Parietaria officinalis	<i>Wall pellitory</i>
* Pedicularis sylvatica	<i>Common louse wort</i>
Phillyrea angustifolia	<i>Narrow leaved phillyrea</i>
Phlomis herba venti	<i>Herbaceous Jerusalem sage</i>
Phlomis lychnitis	- - -
Physalis alkekengi	<i>Winter cherry</i>
Pistacia terebinthus	<i>Common turpentine tree</i>
Plantago albicans	<i>White plantain</i>
* Plantago major	<i>Great plantain</i>
* Plantago maritima	<i>Sea plantain</i>
Plantago psyllium	<i>Branching plantain</i>
Plumbago Europæa	<i>Common leadwort</i>
Polygala Monspelliaca	<i>Montpelier milkwort</i>
* Polygonum convolvulus	<i>Binding snakeweed</i>
* Polygonum persicaria	<i>Spotted snakeweed</i>
* Populus alba	<i>Abele poplar</i>
Portulaca oleracca	- - <i>purslaine</i>
* Potentilla verna	<i>Spring cinquefoil</i>
* Poterium sanguisorba	<i>Burnet ironwort</i>
Prunella hyssopifolia	<i>Hyssop leaved selfheal</i>
Prunella laciniata	<i>Jagged selfheal</i>
* Prunella vulgaris	<i>Common selfheal</i>
Pforalea bituminosa	<i>Three-leaved Jupiter's beard</i>
Punica granatum	<i>Pomegranate</i>

Quercus

<i>Quercus ilex</i>	<i>Evergreen oak</i>
* <i>Ranunculus acris</i>	<i>Upright crowfoot</i>
<i>Reseda luteola</i>	<i>Dyer's yellow weed</i>
<i>Reseda phyteuma</i>	<i>Rampion yellow weed</i>
<i>Rhamnus alaternus</i>	<i>Alaternus</i>
<i>Rhamnus catharticus</i>	<i>Purging buckthorn</i>
<i>Rhamnus pyrenaicus</i>	- - <i>Buckthorn</i>
<i>Rhus coriaria</i>	<i>Myrtle-leaved sumach</i>
<i>Rosmarinus officinalis</i>	<i>Common rosemary</i>
<i>Rubia tinctorum</i>	<i>Dyer's madder</i>
* <i>Rumex acutus</i>	<i>Sharp pointed dock</i>
<i>Ruta graveolens</i>	<i>Broad leaved rue</i>
<i>Ruta linifolia</i>	<i>Narrow leaved rue</i>
* <i>Salix rosmarini folia</i>	<i>Rosemary willow</i>
* <i>Salix helix</i>	<i>Rose willow</i>
<i>Salvia ceratophylla</i>	- - -
<i>Salvia officinalis</i>	<i>Garden sage</i>
<i>Salvia sclarea</i>	<i>Clary sage</i>
<i>Salvia viridis</i>	<i>Green sage</i>
* <i>Sambucus ebulus</i>	<i>Dwarf elder</i>
* <i>Sambucus nigra</i>	<i>Common elder</i>
* <i>Samolus valerandi</i>	<i>Pimpernel marshwort</i>
<i>Scabiosa integrifolia</i>	- - <i>Devilsbit</i>
<i>Scabiosa stellata</i>	<i>Starry devilsbit</i>
<i>Scorzonera Hispanica</i>	<i>Scorzonera</i>
* <i>Scrophularia aquatica</i>	<i>Water figwort</i>
<i>Scrophularia canina</i>	<i>Dog's figwort</i>
* <i>Sedum album</i>	<i>White stonecrop</i>
	* Se-

110 TRAVELS THROUGH SPAIN.

* Senecio vulgaris	Common groundsel
* Serapias longifolia	Long leaved belleborine
Sideritis hirsuta	Hairy trailing ironwort
Sideritis incana	- - -
Sideritis scordivides	- - -
* Silene nutans	Nottingham catchfly
* Solanum dulcamara	Woody nightshade
Solanum lycopersicon	Love apple
* Solidago virga aurea	Common golden rod
* Sonchus alpinus	Blue sowthistle
* Sparganium erectum	Great bur reed
Spartum scoparium	Common broom
* Spiræa filipendula,	Dropwort meadowsweet
* Stachys alpina	Mountain clownbeel
* Statice armeria	Seabrift
* Stipa capillata	Fine feathergrafs
* Stipa pennata	Downy feathergrafs
Symphytum tuberosum	Comfryl
Telephium imperati	True orpine
Teucrium capitatum	- - - Germander
* Teucrium chamædrys	Wall germander
* Teucrium chamæpitys	Ground germander
Teucrium pseudocha-	- - - germander
mæpitys	
* Teucrium scordium	Water germander
* Thalictrum flavum	Common meadow rue
Thymus alpinus	Mountain thyme
Thymus mastichina	Maslick thyme
Thymus zygis	- - - thyme
	Trodilium

Tordilium apulum	<i>The least hartwort of Apulia</i>
* Tragopogon porrifolium	<i>Purple goatsbeard</i>
Tribulus terrestris	<i>Caltrop with chick leaf and prickly fruit</i>
* Trifolium melilotus officinalis	<i>Melilot trefoil</i>
* Trifolium pratense	<i>Honeyfuckle trefoil</i>
* Triglochin maritimum	<i>Spiked arrowgrafs</i>
* Triglochin palustre	<i>Marsh arrowgrafs</i>
* Tussiloga farfara	<i>Coltsfoot butter bur</i>
* Ulmus campestris	<i>Common elm</i>
* Valeriana calcitrapa	<i>Valerian with leaves, like those of the star thistle</i>
* Veronica anagallis aquatica	<i>Pimpernel speedwell</i>
* Veronica beccabunga	<i>Brooklime speedwell</i>
* Veronica hederifolia	<i>Ivy leaved speedwell</i>
* Verbascum Thapsus	<i>Great mullein</i>
* Verbena officinalis	<i>Common vervain</i>
* Viburnum lantana	<i>Pliant meal tree</i>
* Vinca major	<i>Greater periwinkle</i>
* Viola odorata	<i>Sweet violet</i>

Besides the above spontaneous plants, the following are cultivated in gardens

Amygdalus perfica	<i>Peach tree</i>
Cratægus oxyacantha	<i>White hawthorn</i>
	<i>Prunus</i>

Prunus domestica	<i>Plumb prune</i>
Prunus cerasus	<i>Black cherry prune</i>
Pyrus communis	<i>Pear apple</i>
Pyrus cydonia	<i>Quince</i>
	Vitis

✠ Since the environs of Trillo had induced Dr. Ortega to give a catalogue of plants in that neighbourhood, in that neighbourhood, it insensibly engages me to add a few words respecting the study of botany in that kingdom, which hitherto had made so little figure as to draw down very pointed reflections from Linnæus, who says, “Hispanicæ floræ nullæ nobis innotuerunt adeoque plantæ istæ rarissimæ in locis Hispanicæ fertillissimis minus detectæ sunt. Dolendum est, quod in locis, Europæ cultioribus tanta existat nostro tempore barbaries botanices! puucissimas istas plantas, quæ nobis in Hispania & Portugalia constant, debemus curiosis class. iii. Tournefortio et paucis aliis.” Linn. biblioth. botanica, part vii floristæ § viii. Hisp. pag. 96. which tended greatly to raise the emulation of the Spaniards; and while that celebrated botanist was taking measures to obtain a permission for one of his pupils to travel through Spain, he received a message from the Spanish ambassador at the court of Stockholm, which greatly surprised him, as it intimated the desire of his Catholic majesty to have a botanist recommended by Linnæus. This appears to have been owing to some English gentlemen then at Madrid, and among them Robert More, Esq; F. R. S. who dining with the prime minister Don Joseph de Caravajal, had been asked their opinion of Spain by that minister, who perceiving that the remark of Linnæus was not without foundation, and being informed that a Spanish flora would turn out as new as it was rich, determined that his country should soon be free from such a reproach; this was afterwards

com-

Vitis vinifera	<i>Vine</i>
Carthamus tinctorius	<i>Bastard saffron</i>
Linum usitatissimum	<i>Common Flax</i>

communicated to Linnæus by Mr. More in his tour through Sweden, and accounted for the application above-mentioned. Peter Læfing, the favourite scholar of Linnæus, was accordingly fixed upon for this expedition, and was received in Spain in the most gracious manner. His surprise was great to find many lovers of botany at Madrid, particularly Don Joseph Ortega, secretary to the physical academy, Don Juan Minuart, chief apothecary to the armies, Don Joseph Quer, first surgeon to the king, who had a splendid botanical garden, and a most elegant collection of plants, Don Christoval Velez, apothecary of the college of physicians, who was possessed of a choice collection of botanical books, with a grand hortus ficcus, and had drawn up a flora Madritensis. Læfing was greatly caressed by these gentlemen, and in return paid a handsome compliment to each, by calling four new plants after their names. Linnæus has taken these names into all the subsequent editions of his *genera* and *species plantarum*, and into the last edition of his *systema naturæ*. Læfing staid about two years at Madrid, making occasional excursions, during which time he collected above 1300 distinct species of Spanish plants. By orders of the court he embarked at Cadiz, in the year 1754, for South America, where he unfortunately died, 22d Feb. 1756, and Linnæus published his letters. See *Iter Hispanicum*, Holmiæ, 1758, and a further account of Peter Læfing's life and botanical writings, in the 2d vol. of Bossu's travels in Louisiana, translated by J. R. Forster, F. A. S. London, 1771.

L E T T E R X.

The royal seat and gardens of St. Ildefonso, with some account of the city of Segovia.

WHSOEVER has seen the gardens of Aranjuez will not think it extraordinary that the sovereign of Spain should have another agreeable seat in the fertile dominions of his crown, but when a traveller has crossed the craggy and bleak mountains of Guadarrama, it will be a matter of singular surprise to behold one of the most dreary rocks embellished with an agreeable villa, where the mines of Mexico have been lavished to effect the alteration; such is the royal seat of St. Ildefonso; for in few parts of the world, the powers of art have been more strenuously exerted to correct the rugged state of nature, and convert a horrid rock into a sumptuous garden, decorated with beautiful fountains, throwing up water to a great height, like those of Versailles; while a variety of trees, brought from different parts of the world, furnish shady walks, in a spot unfavourable by nature to all kind of vegetation; shewing to what the art of man can attain, and fully evincing the efforts of Philip the Vth. who at the expense of millions of

of dollars changed a barren and solitary mountain, into one of the most desirable spots in his kingdom; yet not without those inconveniencies which all the power of art cannot conquer; for on account of its lofty situation, the night air, even after the hottest summer's day, is so piercing, that it makes precaution necessary, to guard against its sudden and pernicious effects. In other respects nothing can be more reviving during the summer heats, than the shade of these gardens, invigorating the languid courtier, whose spirits are further revived by the coolness of the groves, added to the most limpid water that eyes can behold, in some places flying up into the air, to an immense height, in others rolling down in torrents, which, when caught by the rays of the sun, seem like so many sheets of liquid silver, of a most amazing brightness. As the cold air of this place keeps every thing back, the king finds a new spring after he has left Aranjuez, while his subjects are dying with heat at Madrid. The earliest fruits are but just ripe in August at St. Ildefonso, carnations and roses then adorn the parterres; September is the season for strawberries, raspberries, currants, and barberries; and snow lies on the mountains till the beginning of June. Many springs run down from the summit, and sides of the mountains, and are collected into a considerable basin at the upper end of the garden, to

which they have given the name of *El Mar*, "the sea;" from whence they are distributed to all the different fountains and water works, the whole garden being on a slope, about two miles in circumference. Other springs with two brooks, form the little river Eresma, abounding in salmon trout, where the king often diverts himself with fishing, under the shade of thickets, beautifully variegated by the pencil of nature.

The dreary mountain at the top of these gardens, is a kind of rock composed of clay and fine sand, which by degrees crumbling and mixing with rotten leaves and roots, forms that light coat of earth, which just covers the rock, and gives nurture to the firs and other trees and shrubs. The foot of the mountain is of granite, and serves for building, sometimes for mill-stones, though rather too soft for this purpose, standing in need of frequent repairs. They get vegetative earth on the North side, about a hundred paces from the green rails of the flower garden, which being further cherished by manure, is laid a foot high on the rock, and by dint of cultivation and care, they are enabled to raise flowers and fruits, whose roots hardly touch the barren soil of the place.

Mr. Bowles informs us, That when the late queen mother lived at St. Ildefonso, the Infant, Don Lewis, her son, had an aviary in the gardens,
filled

filled with a great variety of beautiful birds; one place was allotted for woodcocks, where they lived for several years. In the middle of their cage a channel of spring water was introduced, which kept up a constant freshness of verdure; a fir tree, stood in the centre, surrounded with shrubs, and they were daily supplied with fresh clods of turf, full of worms, which, though they hid themselves ever so much therein, the bird would instantly discover by the smell, and driving in his long bill bring them immediately out, then raising his head towards the sky, and extending the worm gently the length of his bill, would let it slide down softly, without any appearance of deglutition; all which was performed with the utmost facility, as if totally unemployed, without ever missing its aim, and should the woodcock be killed at that moment, these nauseous worms would immediately contribute towards the forming a delicious repast at the most elegant tables.

The palace of St. Ildefonso has a noble collection of excellent pictures. In the gallery there are many fine statues bought at Rome, out of the collection of queen Christina of Sweden; amongst which the groupe of Castor and Pollux sacrificing, and a fawn, are undoubtedly the most beautiful. The statues in the garden are chiefly of marble of Granada, some few of marble of Carrara: there is nothing else remarkable except the
fine

fine looking glasses made in the king's glass house at St. Ildefonso, which supplies all the palaces; they have here the largest tables perhaps in the world for running plate glass. The greatest being 145 inches by 85, and its weight 405 arrobes. The smaller is 120 inches by 75, and weighs 380. This curious art was first invented by the Sieur Abraham Thevart, who proposed it to the court of Versailles in 1688, and is performed much like the casting of sheet lead by the plumbers, by which means they are enabled to make glasses of double the dimensions of those, by the Venetian method of blowing, besides other improvements.

At a small distance from the palace, at a place called the *Mata*, near the powder magazine, there is a vein of quartz, which appears above ground, running from South to North for about half a league, till it enters and loses itself in the opposite mountain. A piece of this quartz, of about six pounds, being cut, seemed very curious, being half transparent, and almost as fine as rock crystal, having a kind of stripe, four fingers broad, between two coats, of a darker quartz. On following this vein several pieces of the same quartz appeared covered with rock crystal of a milk colour, forming those veins called by miners, "noble veins." Mr. Bowles acknowledges he did not more particularly examine, or make any essay in
this

this place; and yet he tells us, he conjectures, and infers that it is an unwrought mine of gold.

The environs of St. Ildefonso and particularly the foot of the mountain are covered with a remarkably fine sort of grass, to which they give the name of *cosquilla*, from its effect of tickling the hand when touched. The root is about eight inches long, cylindrical, and about the size of a pin, diminishing towards the point; in the middle of this root, which is smooth, the stem springs up, bearing small capsules at their points, inclosing the seed; in many places, and particularly at Segovia, they make use of it at Christmas for ornaments in the churches, to imitate verdure; also little brooms are made with it to sweep away dust; it likewise grows in abundance in the plain of Olmedo, and is seldom to be seen elsewhere.

It is only a few hours ride from St. Ildefonso to the city of Segovia. The naturalist will meet with many objects of curiosity in the environs of this city, observing its different species of marble, granite, limestone, clays, and three sorts of sand.* It's famous Roman aqueduct remaining so perfect to this day, will prove the solidity of its materials, more effectually than long dissertations. Monsieur Seguiér's

* Mr. Bowles enters into many details respecting the variety of sand, clays, &c. in the environs of Segovia, which, not being considered as universally interesting, are omitted.

Seguier's method of discovering the inscription on the *Maison Quarree* at Nimes, the invention of which is originally due to that celebrated antiquary, Monf. Peyresc, might likewise serve to discover that, which was formerly on the aqueduct of Segovia, for the place of the inscription, marks, and holes of the letters, are yet very visible. ‡ This place is much dwindled at present from what it was formerly. The cathedral is handsome and has been lately repaired; the mint in this city only serves for copper: gold and silver are coined at Madrid and Seville. The alcazar or castle is curious and in a fine bold situation. The unfortunate Duke de Ripperda was confined here, they shew you the dark room, from whence he made his escape, and the broken lock on the door is still in the same situation.

LETTER

‡ The little square in Segovia, from whence you have a principal view of the aqueduct, is called *El Azoguejo de Segovia*, as a diminutive of the Arabic word *Zocq*, which signifies a square or market-place. This place is mentioned in *Don Quixote*, and ignorant translators, because the Spanish word *azogue* also signifies quicksilver, call this place the *Quicksilver House of Segovia*. Delpino, in his Spanish dictionary tells us, without any authority, that a market is so called, because the people in it are continually moving like quicksilver.

L E T T E R XI.

Departure from Madrid for the city of Burgos.

ON leaving Madrid, to go into Old Castile, the first grand objects which strike the eye of a naturalist, are the mountains of Guadarrama, that divide the two Castiles; you leave the famous Escorial on the left, and following the new road, ascend these lofty mountains, whose tops, and particularly where the marble lion stands, are chiefly covered with fern, which is common here, though scarce in other parts of this country. From the highest part of the road, there is an extensive prospect of Old Castile, which is more elevated than New Castile, and forms a spacious plain not unlike a great sea. An easy descent leads to the *Hermita del Christo del Caloco*, where grey and blue marble is dug out of the adjacent mountain, and is found almost close to the road. The mountain terminates at Villacastin, but the grand plain only commences at Labajos, where they sow the peas called *Garbanzos* in a fine blackish soil, but they are not equally tender and large every year, no more than at Salamanca or Zamora; for though
the

the land is good for this sort of pulse, its success depends much upon the weather.

A new bridge has been lately built over the river Almarza, whose banks are lined with poplar and elm; half a league further there is another plain, without a single tree, but water is found at two or three feet depth; so that a very slight plough answers the purpose, it being sufficient to tear away the weeds, to secure a good crop of wheat; this is generally the case in Castile, where they have fine harvests without being obliged to wait for rain to sow their corn, the vicinity of water and strong dews being sufficient to fertilize the soil, the reverse of what happens in the southern parts, where the water is deep under ground, the soil dry and tough, and strong ploughs must be used; besides waiting for rain, or an appearance of its falling, otherwise the grain hardens, and is in danger of being devoured by birds, insects, or rats. In these plains, the villages are numerous, as well as the vineyards, the soil is sandy, and yet, by means of the nearness of water, produces plenty of shumach; every house has its garden, and the sides of the road are chequered with the lychnis, and oak of Jerusalem. Though the plain I have just mentioned is of about eight leagues extent, without the appearance of a spring, or a brook, the inhabitants drink the waters of wells

wells and cisterns, without any bad consequences, or being troubled with agues, as the water does not stagnate, but has a current near the surface, and regains from a higher region, what it loses by evaporation. This accounts for their having such fine pastures and grass in Castile, and so many herds of cattle, with such a variety of game, birds, and wild and domestic animals.

Near Valladolid there are groves of fir trees terminated by an extensive plain, covered with green wormwood, oak of Jerusalem, and thyme, of that beautiful sort called *thymus legitimus Hispanicus*. The city of Simancas* appears on the left,

* The records of the kingdom having been found to be in great confusion, and a large collection of valuable papers discovered at Valladolid, Philip II. ordered his chief architect, Juan de Herrera to construct proper apartments at Simancas for their preservation, and they were disposed of in nine grand divisions, or apartments, accordingly. In the strongest, called the *Cubo*, were those relating to Granada, Indies, right to Naples, Navarre, Portugal, Vicariate of Siena, monarchy of Sicily, establishment of the inquisition, wills of kings, capitulations of peace with France, with Moorish kings, with the House of Austria, marriages of Catholic kings, grants of military orders, and state papers from the time of Ferdinand V. all which are preserved in wooden cases fixed in the wall. In the year 1592 the king visited them. All the proceedings relating to the imprisonment and death of Don Carlos his son, were deposited in a trunk carefully locked. Another apartment

left, about two leagues distance, as you enter the once famous city of Valladolid, situated on the banks of the Pisuerga. This large city, exclusive of colleges and some churches that have good remains of gothic architecture, now only exhibits the dismal remains of its former grandeur; and the palace where Philip the second was born, has nothing but bare walls, where bats and spiders quietly inhabit the mansions of the great emperor Charles, and the Philips his progeny.

Every thing is barren with dreary aspects of flat topped, barren sand hills as far as Caveron, where they have vineyards and make a tolerable light red wine. Leadwort is common on the side of the road, whose leaves pounded, are said to be good against the gangrene. The vineyards are numerous,

ment was built for accounts, and other office papers; in another were papers relating to royal palaces, law suits, grants, knights of military orders, and Indies; another for records of corporations; and in another the memorials and letters of kings, princes, and states, concerning Flanders, since the rebellion. Vida de Philippe II. d. Por Luis Cabnera de Cordova. Madrid, 1619. The American papers alone fill the largest apartment of this *Archivo*, and are said to compose 873 large bundles. The prospect of such a treasure had excited the most ardent curiosity of the elegant historian of America, but the prospect of it was all that he enjoyed. Preface to Dr. Robertson's hist. of America.

numerous, near the town of Duenas,* which belongs to the Duke of Medina Celi. The plain extends to Rodrigo, whose environs produce a little lavender, two sorts of shrubby Jerusalem sage, with a sage leaf, and meadow ragwort, which are the only plants the country affords. All the territory of Campos is so bare and destitute of trees, that the inhabitants are obliged for fuel, to burn vinestocks, straw, dung, and the few aromatic shrubs they can find; their kitchens are like stoves, and they sit round them on benches, giving to these wretched hovels the emphatic name of *Glorias*. A solitary elm or a walnut tree now and then appears near a church, a sure sign that water is not far from the surface, and that its roots have partaken of it. When this happens, independent of every vicissitude of weather and climate, other trees would thrive in like

* A Spanish proverb says, "*Ruyn con ruyn que assi se casan en Duenas*—Mean with mean, for thus they marry in Duenas." In 1506, Ferdinand of Aragon, after the death of his wife Queen Isabella, of Castile, was married here a second time to the Lady Germana de Foix, daughter of John de Foix, viscount Narbonne, by Maria, sister to Lewis 12th of France. This match having been made by the political Ferdinand, to cement his union with France, might perhaps displease the Castilians, and have given rise to the proverb. At present Duenas seems ill prepared for such splendid guests, and indifferently provided, even to celebrate the nuptials of a reputable farmer.

like manner, and the country might be rendered shady and pleasant, instead of being the most desolate in Europe; but it is no easy matter to conquer prejudices, or dissuade the Castilians from that erroneous notion, that an increase of trees would only augment the number of birds to eat up their corn, and devour their grapes.

On approaching the hills, the pebbles which had almost disappeared, shew themselves again, encreased both in number and bulk, and although from Labajos they were scarce larger than oranges, they are now double that size, and rounded, which the others are not, covering the tops of the hills: it is somewhat singular, that these stones, which are of a fine sandy grain, and are found every where in this province, should be of the very identical sort and colour, as those of La Mancha, Molina de Aragon, and other parts of Spain.

The country from hence to Burgos, produces plenty of wheat, and some flax; the road is a continual though gentle ascent, with much conglutinated sand stone, of which there is a sort near Burgos, so firmly conglutinated with small pebble that it forms a marble like the *Brecca*,* and takes a good polish, specimens of

* The breccia filicia is the plumb pudding stone. This stone is of a very elegant appearance, when cut and polished;

of which may be seen in the choir of the cathedral of Burgos. The environs of this ancient city are remarkably pleasant, and shady, with many beautiful avenues; the hills are no longer flat-topped, but have a chearful appearance; the waters are pure and salubrious, the rivers abound with trout, eel, and cray-fish. Though the air is sharp and rather piercing, it is esteemed very healthy, and Castile may justly be reckoned the country of partridges, hares, rabbits, and lamb. They do not sow their wheat before August, nor are grapes ripe before that time. The wild thistle with yellow flowers, is seen every where near the roads, and plenty of meadow sweet.

The city of Burgos is situated on the side of a hill, at the bottom of which, the river Arlanzon washes its walls, and has three stone bridges over it. The cathedral is a magnificent gothic structure, and one of the finest in Spain. The city is well inhabited by ancient nobility, and was formerly the residence of their kings. It gave birth to that illustrious hero Fernan Gonzales, and near the place where his house stood, a triumphal arch has been erected to his memory at the expense of the city, with the following inscription:

ed; it is found in England. See Essay towards a system of minerology, by Axel Fred. Cronsted; second edition. London, 1772. Sect. CCLXXIII.

FER-

FERNADO GONSALVI CASTELLÆ ASSER-
TORI. SVÆ ÆTATIS
PRÆSTANTISSIMO DVCI MAGNORVM RE-
GVM GENITORI
SVO CIVI INTVS DOMVS AREA SVPTV
PVPLICO AD ILLIVS
NOMINIS ET VRBIS GLORIÆ MEMORIÃ
SEMPITERNAM.

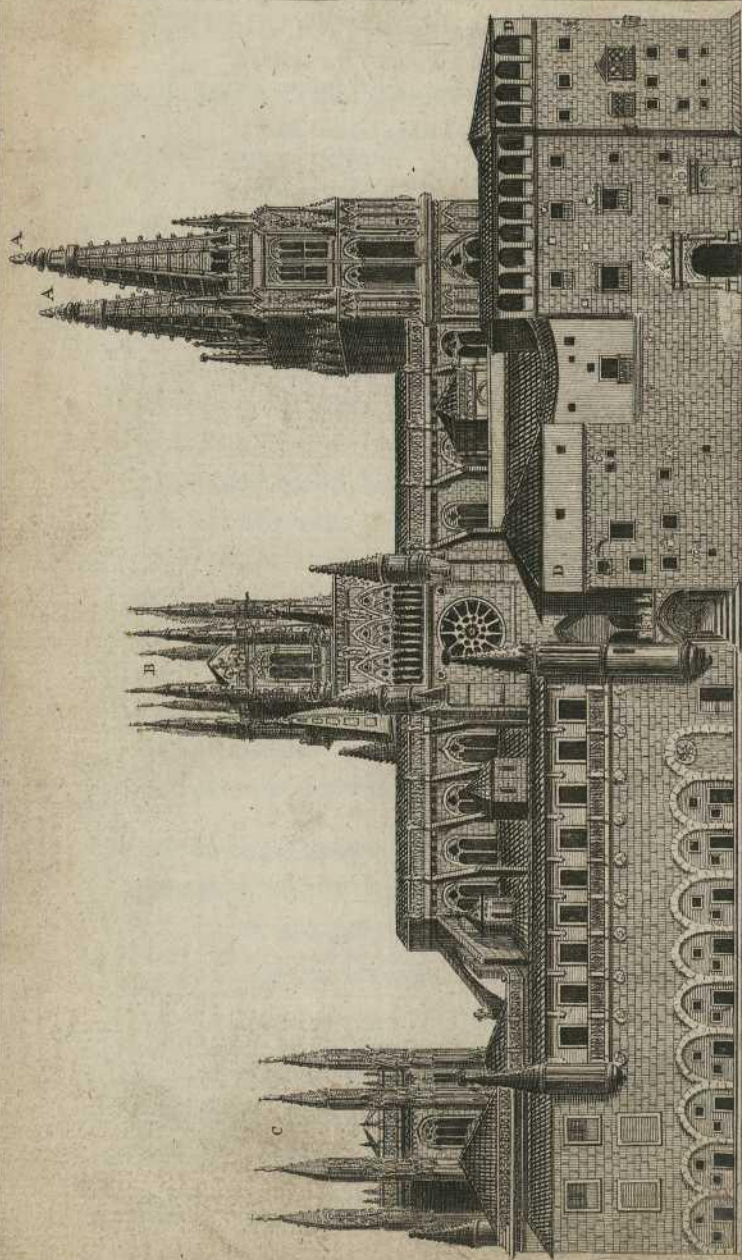
The parish church of Santa Gadea (St. Agatha) more ancient than the cathedral, is remarkable for being the place, where that renowned champion Ruy Diaz de Bibar also a native of Burgos, commonly called the *Cid Campeador*, * obliged king Alfonso the 6th, before he was proclaimed, to swear three times publicly, that he had no concern in the murder of the late king Sancho his brother, at the siege of Zamora, where he was treacherously slain by a Spanish knight, whose name was Heliel Alfons, though he is usually called Velido Dolfos. The words of this extraordinary oath were as follows.

You come to swear, that you had no hand in the death of my lord the king, that you neither killed him, nor gave counsel therein.

The king and his nobles answered, *Amen*.

If

* The title of Cid is derived from an Arabic word which signifies Lord. See Don Quixote. It must have been common in those days, for in the Spanish chronicles, it is sometimes given to Jews.



CATHEDRAL OF BURGOS.

A. A. Steeples at the principal Front. B. Tower in the Centre, with eight Pinnacles to the figure of Santiago. C. Chapel of the Countess of the Conditable D.D. Archbishop's Palace.

If otherwise, may you suffer the same death as that of my lord; may a villain kill you, let him not be a gentleman, nor born in Castile, but come from foreign parts, nor be of the kingdom of Leon.

The king and his nobles answered, *Amen.* †

After this ceremony, Alfonso was solemnly proclaimed king of Castile, Leon, Galicia, and Portugal, in the presence of the infanta his sister, and the prelates, and nobles of his kingdom.

As Burgos was formerly a place of so great importance in the affairs of Castile, it is impossible to look with indifference on these venerable remains, or view its magnificent cathedral, without calling to mind some particular period of its eccle-
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fiastical

† At the second time of tendering the oath the king changed colour, and at the third he was greatly displeased, saying, “Rodrigo Diaz why do you press me so hard and make me swear to day, when you will come to kiss my hand to-morrow;” to which that warrior replied, “Yes, Sir, if my services are properly considered, for in other kingdoms, knights are also rewarded, and you must do the same, if you mean to retain me in your service;” which speech the king never forgave, and soon after ordered him to retire out of the kingdom, allowing him only nine days for that purpose. The Spanish chronicles are full of the achievements and feats of the *Cid*. He died in 1099, and is buried in the church of St. Pedro de Cardena, near Burgos, where his memory is held in the highest veneration.

fiastical history; none seems more striking, than when the son of a Jew was raised to that see, and became one of its most illustrious prelates. Such was *Paulus Burgenfis*, whose extraordinary elevation is worthy of notice. This great man was the son of a rich Jew at Burgos, of the tribe of Levi, whose name is not mentioned in history. In the year 1376 Paulus married Joanna, of the same tribe as himself, by whom he had four sons and one daughter. Gonzalo, his eldest, bishop of Plafencia and Siguenza; Alfonso, who succeeded his father in the see of Burgos; Pedro, Alvaro, Sancho, and Maria, who all at the conversion of the father, took the name of *Santa Maria*, and when Paulus was made bishop of Carthagera, they assumed the surname of *Carthagera*.

Paulus had been for many years firmly attached by education, and principle to the Jewish religion, and being a man of great learning, enforced his opinions with vehemence. At this time the Jews professed their religion publicly in Spain, and held offices of trust and emolument. At the age of forty, Paulus Burgenfis embraced the Christian religion, and on the 21st of June, 1390, was publicly baptised in the cathedral, by Don Garci Alfonso de Cobarruvias, treasurer of the church, whose coat armour was assumed by Paulus, in memory of this event, which was a *lily argent, in a field*.

field vert, desiring to have the name of Paul in baptism, from his particular attachment to the sacred writings of that great apostle, of whom he used to say, “*Paulus me ad fidem convertit. Pauli mihi indebile nomen una cum caractere assignari deponso.*”

His two sons were baptized at the same time, his eldest being eleven, and the youngest only two years of age. His father had been dead some time in the Jewish religion, and his mother still continued so with remarkable steadiness, though she yielded at last to the arguments of her son, but his wife was inflexible; for which reason the marriage was dissolved, and Paulus took upon him the clerical habit, pursued his studies with new zeal, and soon after went to Paris, where he received the degree of master of arts, and continued writing to his late wife, using every argument to convince her of the sublime truths of the Christian religion, in which at last he had the happiness to succeed. He then set out for Avignon, was made archdeacon of Trevino, in the see of Burgos, and a canon of Seville. At the age of fifty-two king Henry the third of Castile, appointed him bishop of Carthage, and he became so great a favourite with that monarch, that he made him chancellor of the kingdom, one of the executors of his will, and tutor to his son and

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heir,

heir, John, then only two years of age, and afterwards king of Castile: finally Paulus was nominated to the see of Burgos with universal approbation, which he refused for a twelvemonth, but at last acquiesced, and took possession of, in 1415, being sixty-five years of age. After the ceremony was performed in the cathedral, he was received with great splendour in his palace, by his mother, his late wife, and all the nobility. He was a rigid persecutor of the Jews, whom he not only inveighed against in his writings, but used all his endeavours to strip of their privileges; if he did not always succeed, he obliged them however to dwell by themselves, in particular parts of the town, and his pupil, King John, drove them out of his kingdom; * amongst the many treatises published against them by the bishop of Burgos, the most remarkable was one intitled "*Scrutinium scripturarum*," reprinted at Burgos in folio, in 1591. At last, this venerable prelate, worn out

* England was the first country that expelled the Jews (in 1281, the 19th of Edward 1st.) They had a similar fate in France much about that time; Spain banished them next, and afterwards Portugal. Oliver Cromwell permitted them to return to England, and the generality of Christians now treat them with more moderation. The popes receive them in Rome, and they sleep in tranquility close to the shrine of St. Peter; but the Spaniards and Portuguese still look on that dispersed people with an universal and national abhorrence.

out with old age and infirmity, was named Patriarch of Aquileia, and had the satisfaction to see his son Alfonso, dean of St. Jago succeed to him in the see of Burgos, and then closed his career in the eighty-third year of his age. Alfonso was equal to his father in virtue and learning. He went ambassador to Portugal, to treat about a peace with Castile, and was afterwards sent in the same character to the Emperor Albert. He finished the beautiful spires of the Cathedral of Burgos, and Æneas Sylvius (afterwards Pope Pius 2d.) files him, "Deliciæ Hispaniarum Burgenfis." He made an attempt, at the council of Basil, to support the precedency of the kings of Castile, before the kings of England, on which occasion he published his treatise, entitled *El tratado de las sesiones*. He also wrote many works on historical subjects; in a word, he lived in such high estimation, that when Pope Eugenius, heard that the bishop of Burgos intended to come to his court, he publicly declared in a full consistory of cardinals, "That if Alfonso of Burgos should ever come to see him, he should be in a manner ashamed, to sit in the chair of St. Peter."*

* España Sagrada por Fr. Henrique Flores. Tom. 26. Madrid, 1771.

LETTER

L E T T E R XII.

Remarkable objects on the road from Burgos to the provinces of Alaba and Guypuscoa, as far as Irum, the last town on the frontiers of Spain, towards France.

YOU no sooner quit Burgos, than new objects appear worthy of attention; for, in crossing an extensive plain, the gum-bearing cistus is seen in great plenty; † it is an evergreen, with long, narrow leaves, gummy and glossy; the flower is inodorous, and composed of five white petals, of the size of a common rose; each petal having a little purple spot on the tip of it. The old branches distil a liquid matter, which the heat of the sun condenses into a white sugary substance, like a piece of gum, of the size of one's finger, and yields a true manna; it is gathered and eat greedily by shepherds and boys. The Spaniards were little apprised of the advantages to be drawn from this plant, till of late years, when, on the representation of the royal college of physicians at Madrid, in 1752, orders were given to two of its members, to make a further investigation of this production; these were Don Joseph Minuart, and

† The cistus ladaniferus of Linnæus.

and Don Christoval Velez, the former went into the mountains of Avila, and the latter, into several districts of Andalusia; it was found that Spain alone could procure manna sufficient to supply all Europe, equal in goodness to that of Calabria, in the kingdom of Naples; for not only an incredible quantity of it, was gathered in the parts above-mentioned, where it is formed about the dog days, but likewise in the mountains of Asturias, Galicia, Cuenca, Aragon, and Catalonia, though no use had hitherto been made of it.*

The descent to Monasterio leads to a valley fertile in corn, soon after the district of Bureba begins,

* Manna is a medicinal drug, of great use in the modern practice, as a gentle purgative, and cleanser of the first passages, and is now become a considerable article of trade. It may be reckoned among the number of gums which exuding from the juice of a tree, and mixing with some saline particles of air, is condensed into those flakes in which it is brought to England. The manna of Calabria is not gathered from the cistus, but from the branches of the ash tree; and we are assured by Robert More, Esq; of Lindley, in the county of Salop, that the Neapolitans have many ways of counterfeiting the several appearances of manna, and that the most common, is with Glauber's salt, and sugar, with a small mixture of manna. It yields to his Sicilian majesty so large a revenue, and he is so jealous of it, that during the season, the woods are guarded by soldiers, who even fire upon people, that come into them, and the stealing of the liquor is death. "See the method of gathering the manna in the kingdom of Naples, in Rolt's dictionary of commerce."

gins, which is a champaign country, and populous, with numerous gardens, well stocked with fruit trees. Near Bribiesca they manure their land with a sort of white marl, of a blueish cast; marl, being in its nature, a compound of different properties of argillaceous and calcareous earths, is of great use in agriculture; it is sometimes soft, at other times hard, like stone, or slate, but generally crumbles by exposure to the air. The strongest sort, which abounds with clay, cannot be so proper for the argillaceous, and stony land of Biscay; but when the soil is light, calcareous, and spongy, not retaining the water, or too much worn out by cultivation, then, a clayish marl will be of service, to procure the additional substance required; and if the land is stiff clay, a calcareous quality is most proper, as it always contains some sand, which helps to loosen the soil, and will give it fertility for a number of years.

The road to Pancorvo traverses calcareous mountains, forming part of those called "Los Montes de Oca," by which the Pyrenees are joined to the northern mountains of Spain. The town of Pancorvo lies in the narrowest part of a valley, closed in by these high hills, having a brook where there is excellent trout. The new road has been cut through the rock, which formerly offered the most horrid aspect to the traveller, threaten-

threatening, as it were, every moment, to fall on his head, but now is safe and commodious, the passage having been considerably widened. The new road from Bilboa reaches as far as Pancorvo, a distance of seventeen leagues, over a continual chain of mountains.

The boundaries of Old Castile are at Miranda de Ebro, three leagues beyond Pancorvo, where there is a bridge over the Ebro,* on the other side of which, the province of Alaba begins, whose inhabitants have likewise made a fine road at their own expense, to the confines of Guypuscoa. The road continues almost to Vitoria, bordering on the river Zadorra, in which the water lily grows plentifully. The hills are of small, and various coloured calcareous stone, conglutinated together: the plants are the *arbutus uva ursi*, or perennial leaved strawberry tree, box, thorny furze, thorny restharrow, the kermes oak, and many sorts of orchis. The first village in the province of Guypuscoa, is Salinas, so called from its briny springs, which they evaporate with a boiling heat, and make salt. It is remarkable, that such springs

* This bridge, which had been so much damaged, and part of it carried away by inundations, when Mr. Swinburne passed this way, and was obliged to go over in a ferry, was entirely repaired when I went over it in July, 1778.

in France, and Lorraine, are always in vallies, but in Spain are constantly found on the tops of mountains, or in elevated places. This just mentioned, is on a very high hill, with numerous petrefactions of shells, in a kind of blueish marble, veined with spar, which has been used in making the road. This hill of Salinas is the highest part of Guypuscoa.

From hence, it is four leagues to Mondragon, so famous for its iron mine in this neighbourhood, of which I shall speak more particularly hereafter. From Mondragon it is a journey of six leagues to Legaspia, passing by a forge on the banks of the river *Oñate*, where they mix the ore of two mines, viz. that of Somorrostro in Biscay, noted for the flexibility of its metal, with the ore of this neighbourhood, which being more abundant and hard, takes forty hours in roasting, and is then fused once without any castina, § getting at each fusion a quintal of iron, following the same method observed with the iron of Somorrostro, as will be described in a subsequent letter.

Oñate is a populous and affluent town; the church, the colonade, and statues of the college, are

§ Castina is a hard calcareous stone, of a whitish grey, used in forges, where iron is fused, in order to absorb the sulphureous acid, that mineralizes the iron, and renders it brittle.

are of sand-stone, full of Mica; † the soil of the hills, and vallies, is a tenacious clay, formed by the total decomposition of the sand-stone, slate, and rotten vegetables. The farmers used to manure it with lime, to loosen the strength of the clay, and absorb its acid, but they now begin to use marl.

It is five hours and a half from Legaspia to Villafrañca, passing by Villareal, where the houses are of sand-stone. They prune the oaks every where in this country, in the same manner as the mulberry trees in Valencia, that they may throw out more branches, to make charcoal for the forges, and they cut them every eight or ten years, as in Biscay. There are few springs in all these hills, though it so frequently rains, owing to the tenacity of the soil, which impedes the filtration of the water, so that they are obliged to drink melted snow from the mountains, yet without being troubled

† Mica, the glimmer, daze, or glift. See Cronstedt's mineralogy, sect. xciii. London, 1772. Mica, or talk, is an earthy or stony substance, consisting of thin, flexible, shining plates; micas have a soft touch, resembling that of unctuous substances. They are not soluble by acids. They are incapable of eliciting sparks when struck by steel, as flints do, for which reason they are called *Apyri*, that is, without fire; nor do they form a tenacious paste with water, as gypsum does. Mica is therefore neither a calcareous, siliceous, argillaceous, nor gypseous earth.

bled with the full-throat, so often attributed to this cause, though more probably arising from obstructions in the glands for want of perspiration.* Two thirds of the inhabitants of this province, pass the days and nights in their smoaky cabins, without chimneys, affirming, that the closeness, and smoak, are conducive to health, as they dissipate dampness, and promote perspiration. The inhabitants are certainly not only robust, but are even seldom troubled with rheums: they are moreover chearful and sociable, having nothing of that shyness observed in the meridional provinces.

From Villafranca,† it is three leagues to Tolosa, one of the three principal cities of Guypuscoa,

* An ingenious traveller lately returned from Switzerland informs us, that he had been at several places where the inhabitants drink no other water than those of rivers and torrents which descend from the *Glacieres*, and yet are not in the least subject to the full throat; so far from it, he had been told, snow water was esteemed a preservative, as well as the clear air of the mountains, and that they had been observed to diminish in elevated places, though they always increased in the vallies, when once they had begun.—Sketches of the natural, civil, and political state of Switzerland, by Will. Coxe, A. M. London, 1779.

† Neither Legaspia, Onate, Villareal, Villafranca, nor Irum, are to be found on the well-engraved map of Spain, by Thomas Lopez, in 1770, who is geographer to the king, and of the academy of St. Ferdinand, and dedicates it to the

coa, and from hence the road continues in sight of St. Sebastians, and Pasage, to Irum, the last town in Spain. Near this place the river Bidasoa enters the ocean, dividing Spain from France, and at a small distance from its mouth, the island of Pheasants is remarkable for having been the place where the Pyrenean treaty was concluded, in 1660, between cardinal Mazarin, on the part of France, and Don Lewis Mendez de Haro y Guzman, on the part of Spain, and the match was agreed upon, between Lewis XIV. and Dona Maria Teresa, daughter of Philip IV. mother to the Dauphin, and grand-mother to the Duke of Anjou, afterwards Philip V. of Spain, father to his present Majesty Charles III.

LETTER

the Prince of Asturias, saying of this map, that it is, "construido con lo mejor, que ay impresso, manuscrito, y memorias de los naturales;" but on the "mapa de las carreras de postas de España," dedicated to Charles the 3d, by Don Ricardo Wall, in 1760, and engraved by the said Thomas Lopez, I find Villafranca, Tolosa, and Irum, but not Legaspia, Onate, or Villareal.

L E T T E R XIII.

Of the iron ore of Mondragon, in Guypuscoa, with some account of the famous Toledo blades, so greatly valued formerly in England.

I Shall now relate some particulars concerning the famous iron mine of Mondragon, which is about a league distant from the town of that name, in Guypuscoa. It is called, by the Spanish miners, "*Hierro Elado*," frozen iron, is found in a red clay, and produces natural steel, with this remarkable circumstance, that it is not to be met with any where else in the kingdom. § They even preserve

§ Steel considered chemically, is nothing else than iron reduced by art to a particular state, which occasions some changes in its properties, but these properties are essentially the same as those of iron; that is, iron and steel are not two different metals, but the same metal, in two different states. Steel may be made by fusion or cementation: the first method is used to convert iron into steel, immediately from the ore, but more frequently from crude, or cast iron; but all ores of iron are not used indifferently, for this purpose, because some of these, which are therefore called *ores of steel*, are much fitter than others, to furnish good steel, and the steel extracted from them is called *natural steel*. Dictionary of chemistry, London, 1777,

preserve to this day, a traditional story that this ore was used for those famous swords, which Catherine of Aragon, made a present of, to her consort, our Henry the VIIIth; some of which still remain in repute in the highlands of Scotland, being suitable to their dress, and are called *Andre Ferrara*, the name of the maker, which is marked on the blades. The famous Toledo blades, those also of Zarragossa, called *Del Perrillo*, mentioned in Don Quixote,* and others, were also supposed to be made of the ore of this mine, which gives forty per cent. metal, though rather difficult to fuse: good steel may be obtained from it with very little trouble, because the iron has in itself the proper disposition

* These swords were called *Del Perrillo*, from the figure of a little dog on the blade; Cervantes endeavours to heighten the courage of Don Quixote, when he attacked the lion in the cage, by adding, "That his sword was of the common sort, and not so sharp as those famous ones, with the Perrillo mark." *Tu magnanimo! con sola una Espada, y no de las del Perrillo cortadorus.* Don Quixote, part II. cap. 70. Madrid, 1771. The Zarragossa artists had three distinct marks on their blades; viz. *El Perrillo*, a little dog; *El Morillo*, a Moor's head; and *La Loba*, a wolf. Swords with the *Loba* mark, have the name of Andre Ferrara on them, and are not uncommon, at this day, in England. They shew a sword in the small armoury of the tower of London, with the name of Andre Ferrara, and no other mark, which was taken in the Scotch Rebellion in 1715.

disposition to receive in the forge, the necessary phlogiston to make excellent blades, but without cementation it perhaps may not answer for files, or razors. These blades were generally broad, to wear on horseback, and of great length, suitable to the old Spanish dress, but this being altered at the beginning of this century, when the duke of Anjou ascended the throne of Spain, the French swords were introduced with their dress, which even now is commonly called in Spanish, a military dress, *vestido de militar*, in opposition to the long black cloak universally worn there before that epocha. So that the old Toledo blades fell into disuse, and the manufacture declined; but his present majesty has again encouraged it, and a new manufacture has been lately set up, by his orders, at Toledo, for the use of the troops, and they are said to be as well tempered as the old ones, and are able to bear most extraordinary proofs; but these are not made of the ore of Mondragon. There are various opinions relating to the old blades, we have been speaking of; some say, they were only tempered in winter, and when taken out of the forge, for the last time, were vibrated in the air, in the coldest weather; others relate, that they were heated till they acquired that colour, the Spanish artists call cherry, and then, were steeped in a tub of oil, or grease, for a moment or two, then plunged, in the same manner, in warm water, all which

which was done in the depth of winter: others will have it, they were made of the natural steel of Mondragon, with a list of common iron in the middle, to make them more flexible, and then tempered in the common way, in the winter season. Such are the prevailing opinions about the blades of Mondragon, which are certainly excellent; but as to the present workmen of Mondragon, or in any part of Guypuscoa, they are yet unacquainted with the secret of converting iron into steel, or tempering it properly, and even in the making of tools, are far inferior to the artists in England: it is somewhat particular, that to this very day, they have no other word in the Spanish language, for a bickhorn, or a bench vice, than *Vigornia*, the Latin name for the city of Worcester, thought to have been once famous for works of that kind.* As many of the most capital workmen of Toledo, quitted that city, on the decline of their trade, and settled in different parts of the kingdom, where they supported the reputation of their art; and as their blades have since been dispersed all over Europe, those who are curious in these matters, will, perhaps, not be displeased to see a list of their names; as by this means they may know them, whenever they fall in their way.

L

Bilboa

* Tesoro de la lengua Castellana per el licenciado Don Sebastian de Cobarruvias Oroasco. Madrid, 1611.

Bilboa	Pedro de Lagaretea
Orgaz	Pedro Lopez
Lisbon	{ Melchior Saanz
	{ Juan Martinez Machacha
	{ Sebastian Hernandez
Seville	{ Pedro de Lezama
	{ Juan Martinez el Mozo
	{ Francisco Alcocer
Madrid	{ Dionisio Corrientes
	{ Antonio Ruiz
	{ Julian Garcia
Cuenca	{ Andres Herraез
Valladolid	Juan Salcedo
Calatayud	{ Luis de Nieva
	{ Andres Munester
Cordoba	Alonso Rios
Zaragossa	Julian de Rey
San Clemente	Lopez Aguado
Cuellar,	{ Bartholome de Nieva
and	{ Calcado
Badajoz	{ Campanero

The following workmen still remained in Toledo.

Zamorano
Thomas de Ayala
Juan de la Horta
Francisco Ruiz, and sons
Juan de Vargas
Juan de Luizalde
Francisco

Francisco Lardi
 Andres Garcia
 Heras, father, son, & grandson
 Alonso de Sahagun and sons
 Fernandez
 Martinez

Any old blades found with these last names, may be undoubtedly considered as true Toledos, and executed by the most capital artists. Cervantes further relates that Ramon de Hoces was famous at Seville for making of poinards. *Debia der ser el tal punal de Ramon de Hoces el Sevillano.*† Nor should I forget the famous *Montante* of Spain,‡ a huge weapon, used with both hands at once, so

L 2 well

† Don Quixote, tom 3. page 298. Madrid, 1771.

‡ Cobarruvias gives to the word *Montante*, an Italian derivation, “*Montante, espada de dos manos, arma de ventaja y conocida, de Montar palabra Italiana que quiere decir, subir, o porque el montante excede la estatura del hombre o porque se juege por lo alto.*—Teforo de la lengua Castellana, por Don Sebastian de Cobarruvias. Madrid, 1611. This curious book may be truly said to be a treasure, according to its title, for those that study the Spanish language, and are desirous of understanding the true spirit and sense of its most difficult words, though the witty Quevedo passes rather a severe censure on it, in his novel intitled, *Cuento de Cuentos*, adding, “*Tambien se ha hecho teforo de la lengua Espanola donde el papel os mas que la razon, obra grande, y de erudicion desalinada.*

well described by Milton, speaking of Michael's sword:

“ With huge two-handed sway
 “ Brandish'd aloft, the horrid edge came down,
 “ Wide wafting.” PARAD. LOST, Book vi.

In the king's armoury at Madrid, besides many curious and complete suits of armour, they have a fine collection of antique swords, amongst the rest, they shew those, said to have belonged to Pelagius, to the Cid, and Bernardo del Carpio; also the sword of king Francis 1st, and that of John George, duke of Saxe-Weimar, taken from him by Charles 5th, at the battle of Horlingen. The swords of the Cid, and Bernardo del Carpio, were made at Zaragossa, but that of Francis, at Valencia, as was also the sword, likewise in this armoury, of that famous hero Garcia de Paredes, with his name on the blade, and on the other side “ plus ultra operibus credite.” Though these details may perhaps be considered of very little moment, it was not so with our ancestors, who set a high value on these Spanish blades, particularly the Tolosos, as may be collected from various passages in our favourite writers, Shakespear, Johnson, and Butler.

LETTER

L E T T E R XIV.

Environs of Reinosa, source of the river Ebro, and intended canal of Castile.

THAT part of Spain called "Montana de Burgos," may be thrown into two grand divisions. The first takes in all that space from the highest part of the mountains, to the Bay of Biscay, and the other, the space extending from the same height towards Castile. The highest part of these mountains, is that intermediate situation between Santander, and Burgos, it being a continual ascent of fourteen leagues from Santander to Reinosa, descending afterwards from thence, as far as Burgos. The source of the Ebro is within half a mile of Reinosa, and runs easterly, till it falls into the Mediterranean, while the Pisuerga runs into the Duero, whose course is westerly, and empties itself into the ocean; from whence it may be inferred, that Reinosa divides the waters between the two seas, and is therefore one of the most elevated districts in Spain, as well as the coldest, its lofty mountains raising their heads as high as the line of congelation, being constantly covered with snow. The soil of Reinosa produces the best oaks
in

in the kingdom, equal to any in Europe, and some thousands of them, are occasionally felled for the service of the navy. Good oaks will not succeed so well in a rich limy soil, abounding with moisture, but require on the contrary, that it should be of an argillaceous nature, stiff and compact, as well as dry, where they suffer no injury from dampness, and thrive by slow and proper gradations. The soil of Reinosa is in general, composed of sandy rock, mixed with quartz, as large as chestnuts, cemented in the rock in the same manner as in the warm climate of Granada. About a league to the north of Reinosa there is a very high mountain called Arandillo, whose summit is at present so much decomposed, as to form an extensive plain where there is very good grass. The people of the country, say there was formerly a town here, and the quantities of loose stones still remaining, seem to confirm the report. The nature of this mountain is singular, its basis being of gypseous stone, its summit of sand stone, and its centre of limestone, with large impressions of cornu ammonis, and several scallop shells fixed in the rock. On the road to Reinosa, black marble veined with white is seen in great quantities; the same may be observed at the *Puerto* between Aspeitia, and Vidana, where there is a mountain of similar marble, from top to bottom. Two leagues to the southward of Reinosa, there is another high mountain,

mountain, with an hermitage at the top, where there is great plenty of bilberry whortle, the *vacinium* of Linnæus; * and to the westward, there is a height where great numbers of Roman coins have been dug out, which indicates its having been formerly a Roman colony: near this place several large lumps of emery are seen above ground, fixed in the sand stone. †

The famous river Ebro, which once served as a boundary between the Carthaginians and Romans, has its source in a little valley at a small distance to the eastward of Reinosa, and proceeds from a copious spring at the foot of an ancient tower, called *Fontibre*; at a few paces from hence, its waters turn a mill, and abound in excellent trout, and plenty of cray fish; in passing by Reinosa, it is increased by the waters of several other brooks, and springs; two leagues lower, it runs by the narrow pass of Montescclaros, receives different supplies in the course of its passage through the vallies, is considerable when it comes to the confines of Alava, and after traversing many open and fertile districts, passes by the city of Tortosa, where there is a bridge of boats over it, and then falls into the Mediterranean at the Al-faque

* *Vitis idea* of Gerard and Ray.

† A more particular account of emery will be given in the second part of this work.

faque islands, but on account of its many rocks and shoals, is not navigable higher than Tortosa, and even so far, only for small craft.*

There is a small briny lake near the source of the Ebro, where they might obtain salt, as is done near the source of the Tagus, in the same manner as in Guypuscoa already mentioned. In winter this lake is covered with wild ducks, and other aquatic fowl; the country is well provided with game, they have partridges and quails in abundance, as well as hares, and in the mountains there are bears. The meadows are covered with usual plants, such as round birthwort, squinancy berries, yellow-weed, parsley leaved vervain, privet, and cockscomb; but of the aromatic sorts, none but pennyroyal. Beech trees are common hereabouts, bearing the mast, which is a kind of a triangular seed in form of a nut, or rather an acorn, containing a whitish oleaginous pith, of an agreeable taste, but the inhabitants are ignorant of the method of drawing oil from this fruit, as in France: they gather it in the same manner as they do acorns, in Estremadura, getting up into the trees and striking them with poles, and use it to fatten the swine. When put under the press and formed into cakes, it makes an excellent fodder for cows, on being mixed with water, and is of great service when they cannot go into the fields on account of the snow.

fnow.* The intended canal of Castile, is to begin at the village of Olea, near Fontibre, about a league and a half from Reinosa, is to pass by Comesa, Cabria, Villaescusa, Estrecho del Congosto, Mave, Villella, Estrecho de Nogales, Herrera de Pisuerga, Oforno, Fromista, Convento de Calahorra, and Grijota; where it is to meet the branch of Campos, that is to come from Medina de Rio Seco, then to continue by Palencia, Duenas, Venta de Trigueros, and La Veruela, and enter the river Pisuerga, below Valladolid; by which means, it will communicate with the Duero, and meet another branch, which is to begin at Segovia, and pass by Hontenares, Bernaldos, Nava de Cocos, Olmedo, Mata-pozuelos, and Villanueva de Duero; but when all this will be executed, those who have travelled through Spain, and observed the slow progress of all public works, may form a tolerable judgment,

* An attempt was made some years ago to introduce the extraction of beech oil in England, and a patent was granted for that purpose, but it did not succeed, the country people choosing to keep their mast to fatten their swine, rather than sell it to answer the purposes and private views of any individual.—Rolt's dict. of commerce. London, 1761.—The nuts, when eaten, occasion giddiness, but when well dried, and powdered, they make wholesome bread. They are sometimes roasted and substituted for coffee. The poor people in Silesia use the expressed oil, instead of butter.—Dr. Withering's botanical arrangement, &c.

judgment, so that this grand improvement with many other projects, of a less solid foundation, may be said to be yet closely enveloped, and hidden in the bosom of time.

L E T T E R XV.

Natural History of the Spanish plant Gayuba, or perennial leaved strawberry-tree.

THE Spanish plant gayuba, having been described by the late Don Joseph Quer, surgeon to his Catholic majesty, and first professor of betany in the royal garden at Madrid, I shall lay before my readers a summary of his treatise, * with the observations which occurred to him in the course of his practice, respecting this plant.

The gayuba, or arbutus uva ursi, of Linnæus, § is indigenous to Spain, for though it grows in Italy and other southern climates, it is found in none so common as in that kingdom. Don Joseph Quer discovered it near the Escorial, and on the

* Dissertacion physico botanica sobre la passion nephritica, y su verdadero especifico, la uva ursi, o *Gayubas*. Su autor Don Joseph Quer Cirujano de S. M. Consultor de sus reales exercitos, academico del instituto de Bolonia, de la real medica matritense y primer professor de botanica del real jardin de plantas de Madrid. 1763.

§ Uva ursi. Clus hist. 63. Hispanic 79, & Tournefort inst. R. H. 599. Class xx.

Tabern

the hills of Buytreras, on the mountains of Manzaneres, in different parts of the Alcarria, * such as the district of Lupiana, mountains of Buen Dia, Albalete de Zorita, Fuente Novilla, and other places: it is particularly common near all the villages, and lands, belonging to the extensive Serrania of Cuenca, all the stony mountains of the lordship of Molina, and near the source of the Tagus. In Aragon, on the mountains of Daroca, *Puertos* of Atea, and Acere on the mountains of Burgos, and Leon, and county of Niebla, and Carrera de Leon, from Contorno de Villalmanzo, to Cogollos; and from Manciles, to Villadiego, as you go from Burgos to Cervera, in so copious a manner, that the place is called *Gayubal*: also on

Tabern Icon 1080. Boerhaave Ind. A. 11. 219. Scheuchz
Itin vii. 520.

Vitis Idæa foliis carnosiss, et veluti punctatis, five *Idæa Radix* Dioscoridis, C. B. Pin. 470. Raii hist. 11. 1489.

Radix Idæa putata et uva ursi L. B. i. 523. *Idæa Radix*
Lugd. 193.

Uva ursi Galeni Clusio. Park, 1458.

Vaccinia ursi, five *uva ursi* apud Dlusium Ger. 1230. Emac
1416.

Arctostaphylon. Siegesb. flor. 13.

Arbutus caulibus procumbentibus, foliis integerrimis. LINN.
H. cliff. 163.

Officin. *Vitis Idæa*.

In Spanish *Gayuba*.

* A populous district is so called, when consisting of villages, farms, and rural improvements.

on the skirts of the Pyrenees of Catalonia, in Biscay, and Navarre, and in the kingdoms of Granada and Valencia; infomuch that the before-mentioned professor adds, that he does not recollect ever to have gone upon a botanical party, without seeing it. It is so universally known in Spain, that it has its particular names in almost every province, as for example :

In Castile, Alcarria, and lordship			
	of Biscay,	-	-
In Leon,	-	-	-
In Bureba,	-	-	-
In Rioja,	-	-	-
In Asturias, the fruit is called	-	-	-
In Albalate de Zoritæ,	-	-	-
In the villages of the Alcarria, indif-	ferently,	-	-
In Utiel, Partido de Requena,	-	-	-
In Real de Manzanares,	-	-	-
In Catalonia	-	-	-

*Gayubas**Agauja**Gaulla**Avuguas**Rebellones**Aguavillas**Gayuberas**Gaubillas**Gallurva**Uba dys**Buxarolla*

The great variety of these names shew, how universal it is all over the kingdom, and proves what little dependance is to be had on the relations of travellers, who only see the high roads, and never deviate from them, to inspect into remote places: even Clusius, the most intelligent, and curious of those writers, tells us, he only saw it at the Venta del Baul, when it can be made appear, that

that in all those parts of Spain, which he traversed, it grows in great quantities; and were all the uncultivated places to be mentioned, where the Gayuba is found, particularly, such as are called *Rubiales*, it would form a list of almost all the stony and uncultivated places in the kingdom. It is perennial and an evergreen, flowers in March, and April, and the berries are ripe in September, and October. The leaves are narrow, rounded at the extremity, and contain only one fibre. The berry is as large as the kernel of a hazle nut. Its singular mode of multiplication is curious, proceeding from the old branches, which trailing on the ground and gently rising, throw out new roots, which maintain its brothers, though the fire should be cut off, or decay; it is pleasing to observe a shoot of two or three plants adorned with stems and branches, with others issuing from them, so that one plant occupies a great space of ground, covered with its green foliage and red berries; but what makes this plant more worthy of attention, is its excellent qualities in calculous cases, being in a manner an *unique* in those cases, where every other specific has its contraindication, while this admits of no kind of danger, nor has ever been complained of by those who have written concerning it; and none of those who used it by the advice of Don Joseph Quer, and acknowledge themselves to be perfectly cured, have ever com-

complained of the least inconvenience, though some were not wanting, who remarked its effects with the greatest exactness; suspecting, that its singular efficacy in the cure of the stone, might perhaps hide other obnoxious qualities, which however the most accurate scrutiny has not been able to discover.

The method generally used, says professor Quer, in administering this simple remedy, is to give the powder of the leaves only, or a decoction in water. Foreigners frequently use the first method, and I have chiefly followed the latter, though I have observed the like good effects from both. When the berry is perfectly ripe, which is upon its acquiring a red colour like coral, it is given in powders from ten grains to a scruple, or half a dram, and from half a dram to one or two drams. The root when in decoction, according to Christian Hermann, from half a dram to two drams: the same with the leaves, or in an infusion, and about a handful, or handful and a half of the leaves or more, and in powder from half a scruple to a dram; but according to my constant practice, I have fixed the dose to two drams of leaves in a pound of water, and when in powders, I always give a dram, because a less quantity only excites pain, and does not come up to the desired effect. It should be used, three or four times a day in the paroxysm, taking a copious draught of
the

the decoction, and if it seems more palatable to a delicate stomach to sweeten it with sugar, it may be done, but must be continued for weeks and months. When the pains have ceased, one dose given daily two hours before breakfast will be sufficient, observing the usual diet, in which case it may also be esteemed an excellent preservative, without being repugnant to those few convivial hours which may fall to the lot of the wisest of men.

It appears to be particularly useful in scorbutic cases, from the testimony of two learned writers of the faculty, Marcus Mappi, and J. Christian Hermannn, in the *historia plant. Alsat.* written by the former, and after his decease published by the latter, where it is said, “Baccæ maturæ hyemis tempore acescunt; valde gratum habent saporem, sub nive vigent et conservantur diu, in locis septentrionalibus, maxima copia crescunt, et cum alis ibidem crescentibus, adæquatum et sufficiens remedium scorbuti præbent, annotante id etiam Joanne Frid. Bachstrom, qui etiam horum myrtillorum rubrorum ingentem vim in istis locis provenire confirmat, provido omnis necessitatis humanæ numinis beneficio.”—Pag. 331.

In the year 1734, after the conquest of Naples, continues Don Joseph Quer, I returned to the court of Madrid, and practised in my profession,
and

and prescribed the gayuba, whose virtues were unknown, though in many provinces, they were well acquainted with the name of the plant. In 1762, I gathered it at Fuente Novilla, to have it delineated; in many places, the country people were surpris'd to see me take notice of it, when according to their notions it was so pernicious to children, who eat of its berries. I prescribed it to a patient, ordering him to boil two drams of the leaves, in a large vessel of water, which had the happiest effect. By this means I introduced the use of it at court, and believe I was the first in Spain who administered it. In further proof of its efficacy, I shall add, that the illustrious Senor Lupia bishop of Leon, having applied in several places, as well abroad as in Spain, for a remedy for a nephritic complaint, they sent him a plant from Rome, with the name of *Buxarola*, whose virtues, as well as name, were totally unknown to us, yet the vegetable exists in great quantities, and is known in the kingdom of Leon by the name of Agauja.

In the year 1740, being at Barcelona, I went on a botanical party, to visit the famous mountain of Montferrate, in company with that celebrated botanist Don Juan Minuart, professor of botany of the royal garden, and we spent two and twenty days in that excursion; my friend was much troubled with nephritic complaints, which were extremely

tremely painful, particularly at that moment when we were at the very summit of the mountain, from whence he found the utmost difficulty to descend; luckily we met the gayuba on that very spot, and when he had reached the convent, he had the most violent symptoms of his complaint, therefore I immediately ordered the following decoction:

R. Gayuba leaves	-	2 drams
Camomile flowers	-	$\frac{1}{2}$ dram
Refined nitre	-	1 scruple.

In a proper vessel, boiled in a pound of water, and left to simmer, over a slow fire, the vessel kept covered, and when removed, not to be shaken; the above to be drank lukewarm, adding half an ounce of refined sugar, and to be taken twice a day; that is, in the morning early, fasting, and in the evening, by which method the fits ceased, and the patient continued it, during the course of our tour, with the most happy effects, having been enabled to complete his researches with comfort and ease.

Thus far our author, who enters into many details, relating to nephritic complaints, and their method of cure, amongst the ancients and moderns, addingal so the practice of Dr. de Haen, of Vienna, with respect to this plant; but as it is so

M well

well known to our physicians in England, * I have only made use of the historical part of his narrative, passing over some trifling reflections on the system of Linnæus, with which he did not seem to be perfectly acquainted; we shall therefore the less regret his Spanish Flora, which he had begun, but only lived to finish the letters A, B, and C; and from so injudicious a method of treating this science, his more enlightened successors will probably never be tempted to continue it.

LETTER

* “*Arbutus uva ursi*, the perennial leaved strawberry-tre, the stems trailing leaves very entire, cup purple, blossoms white. In the Highlands of Scotland, and in Wales, upon the mountains. The berries are insipid, pulpy, and mealy. The plant is much used in Sweden to dye an ash colour, and to tan leather. Half a dram of the powdered leaves, given every, or every other day, hath been found useful in calculous cases. It was first used for this purpose at Montpellier, and afterwards Dr. de Haen, at Vienna, relates several cases in which it proved of the greatest service; its success in England has been uncertain, sometimes the patients found no relief, but thought their complaints rather aggravated, than alleviated; whilst in other calculous and nephritic cases, the symptoms have been almost entirely removed. Perhaps, upon the whole, we shall find it no better than other vegetable astringents, some of which have long been used by the country people, in gravelly complaints, and with very great advantage, though hitherto unnoticed by the regular practitioners”——Botanical arrangement of all the vegetables growing in Great Britain, &c. by William Withering, M. D. Birmingham, 1776.

L E T T E R XVI.

Description of the lordship of Biscay, and its products.

THE lordship of Biscay is a mountainous country, about twelve leagues in length, from east to west, and eight from north to south, consisting entirely of hills, and mountains, of various dimensions, most of which are cultivated to the very summit, the vallies being checquered as well as the hills, with villages, farms, arable land, and pasture; the whole with such infinite variety and beauty, as to form a delightful landscape, with the most pleasing and romantic aspects the mind can conceive: the surface of earth generally lies over masses of stone, or detached rocks, limestone, sandy or grit stones, and sometimes valuable marble of various colours, particularly that dark grey inclining to black, streaked with white. The pillars in the king's chapel at Madrid, are of this sort, and come from Manaria; at other times, the surface extends over iron mines, though that of Somorrostro is the most considerable, and employs the greatest number of forges.

Many of these mountains, consist of hills piled up upon each other, like that of Gorveya, which

M 2

takes

takes five hours to ascend ; its summit affords a beautiful plain, with abundance of pasture, where the herds of Biscay, and Alaba remain for some months. Amongst other plants, it produces the *Ribes*, or black currant, whose leaves have a flavour of pepper, and are reckoned useful in gouty complaints. Near Durango the hills are bare, and from their steepness, very difficult to ascend. *Serantes*, near Portugalete, is another high hill, in the form of a pyramid, and being seen at a great distance, is a good land mark for mariners, sailing into the river of Bilbao : from its shape it seems as if it had been a volcano ; many have erroneously taken it, for the mine of Somorrostro, but this is at a league distance. There are other mountains of half a league or a league in length, with craggy peaks, whose sides nevertheless admit of cultivation, and dwellings, such as that of *Villaro* ; others are low and flat topped, covered with earth, having farms and habitations, besides wood for charcoal, and even meadows for pasture, extending to their summit, but none yield products in proportion to their surface : for the vegetative system rising in a perpendicular line, an oblique superficies cannot support more trees or plants than a plain of equal basis ; as on a triangle one cannot raise more perpendiculars, than such as fall on its immediate basis.

Small

Small rivers and brooks issue from the crevices and clefts of these mountains; from Gorveya there run four, which uniting with that from the great mountain of Orduna, added to other torrents bursting through gullies where there is no water in summer, serve to form the river of Bilbao: these are so tremendous in winter, when swelled by heavy rains, as even to threaten the town with destruction, if they unfortunately met the tide at high water; the inhabitants are often alarmed in this manner, and it is common with them to go about the streets in boats at this season of the year.

If we except the ploughed fields, and the bare tops of some jagged mountains, all the rest are covered with woods, either for timber, or charcoal; some are natural, such as the holm, and arbutus, others are sowed, or planted, particularly oaks, which grow very fast. Where there are no woods, and a good depth of soil, it produces impenetrable thickets of the shrub called *Argoma*, as well as Cantabrian heath,* and fine gorze. Higher up, where there is less earth, the sides of the hills, and the vallies, have plenty of grafted chefnuts, which the Hamburgh ships carry away in great quantities from Bilbao. The apple tree seems here to be in its natural soil, and thrives admirably without cultivation;

* *Erica cantabrica flore maximo foliis myrti, subtus incanis.* Ray's Sym. 472.—*Andromeda Daboëcia.* Linn.

tivation; the whole country produces varieties of this fruit, but those of Durango are the best. Renets are common of two or three sorts; cherry trees grow as high as elms, at *Gordejuela*. They have excellent peaches, which they call *pavias*, with this remarkable circumstance, that they are never grafted, or improved by any particular culture. † Those of Aranjuez are of this kind, but have not their flavour nor mellowness. Of pears they have great variety, and also those choice sorts, as the beuerre, fondante, doyenne, and bergamotte; besides abundance of figs, nuts, and currants; and though the country does not produce raspberries naturally, it abounds with excellent strawberries, as well as all manner of garden plants, greens, and pulse in perfection. Their onions are remarkably sweet; Galicia furnishes them with turneps for cattle, and they have the small ones for the kitchen; their cows and oxen are small, but stout and robust: goats they had better be without, as great care must be taken to prevent them from destroying the trees: sheep they have none, and indeed it would be a difficult matter

† The French distinguish peaches into two sorts, viz. pavies and peaches. Those are called peaches which quit the stone, and those whose flesh adheres closely to the stone, pavies, which are more esteemed in France than the peaches, though in England the latter are preferred by many. —Miller.

matter to hinder them from continually entangling themselves amongst the thickets. They have six or seven sorts of grapes, of which they make the *Chacoli* wine; all spots are not equally favourable; however the vineyards are numerous about Orduna and Bilbao, and form the principal revenues of the country gentlemen; but as the prices are fixed, and no foreign wine can be introduced nor sold by the publicans, while their own vintage is selling, they are more eager to increase the quantity than meliorate its quality, for which reason it is in general bad; besides, they make their vintage too early, which gives a sharpness to the wine, and deprives it of body; and being unskilful as well as careless, mixing the rotten and sour grape with the rest, *Chacoli* is a very poor wine. Their whole vintage will not suffice for four months consumption, and the deficiency must be made up from the province of Rioja, which occasions a saying, "That all the iron of Biscay is swallowed down in foreign wine, by the natives." Even Englishmen and Germans, are people of great sobriety, compared with many Biscayners, yet drunken men are seldom seen in the streets, because they are accustomed to eat heartily in these drinking entertainments; both men and women breakfast, dine, eat in the evening, and sup very plentifully; and yet enjoy excellent health.

Most

Most of the mountains of Biscay, and Guypuscoa, are of an argillaceous substance, the stone decomposes very little, or resolves into earth, though calcareous stone is abundant, and in many parts they have manured for ages past with lime, yet it has caused very little alteration; the argillaceous substance seems to absorb the calcareous, mixed with it, for though lime is the best ingredient to loosen the argillaceous particles which cling to the roots of delicate plants, and hinder them from penetrating further, and also to correct the acid, and convert it into more tractable land, yet those of Biscay still preserve their tenacity; that were it not for extraordinary labour, they would only produce thickets of brush wood, and briars: to prevent which, they turn up the earth with iron prongs, which instrument they call *laya*. Three or four labourers unite together, for one alone would make no progress; by this means they separate large pieces of turf, which are turned upside down; then another person comes, and in the trench which they have made, cuts away the weeds and roots, and the turf is next broke with the spade, and the winter frost detaches it still more. This operation is termed *Layar*.

In spring they draw a harrow over it with oxen, then separate it still more with another harrow; if all this will not do, they beat it with wooden mallets; then with a spade they dig holes in
straight

straight lines, at two feet distance from each other. In every one of these, they sow three or four grains of maiz, a few seeds of pumpion, some kidney beans, and peas, then filling the hole with manure, they cover it over with earth.

Between September and October the ears of maiz are ripe, and they cut the plant close to the ground, leaving the root to serve as manure. The cattle eat the leaves; and the stalks being trod under foot, serve likewise for manure. After the corn is sowed, they slightly turn the earth, during the winter, with a long and narrow spade, to break it more effectually, and loosen the strong substance; this they call *sallar*. In May or June they do the same once more, to destroy the weeds, which would otherwise stifle the grain. Their harvest time is in August, and they leave the stubble till winter, for pasture, when they again renew the work of the *laya*. This may be done continually with land contiguous to a farm, which partakes of its manure, or has lime thrown over it; but the lighter soil is generally left fallow a twelve month; some soils are so soft and flexible, as not to require a stronger plough than is used in Castile; but in such they only sow wheat, and as tractable land is scarce, they break up the sides of the mountains, which, having little depth, will not bear large trees, and are generally covered with furze; for this purpose they inclose, with a hedge,

hedge, the ground to be broke up, turn up the earth with a spade, cutting turf four inches deep, entangled with weeds and roots; after these roots are thoroughly dried, in July or August, they pile the turf in the form of a pyramid, setting fire to the whole, and covering it with earth to prevent inflammation, so that the earth may be burned in the same manner as charcoal. They spread out this burned turf, which acquires the colour of brick-dust, then till the land and sow their corn; the three first years they have a plentiful harvest of wheat, the fourth they sow barley, and the fifth flax; then the land begins to wear out, the hedge is taken down, and it affords tolerable pasture till its surface gets covered with brambles and weeds. All this hard labour is necessary to oblige this stubborn soil to maintain such numbers of people, who like to live well, and stand in need of good food, to support such constant fatigue; even all this will not do, they are still forced to get corn from Castile, or elsewhere, but they always prefer that of Castile, as better though dearer. In the same manner they depend on their neighbours for other kinds of food, as in so close a country, covered with woods, little is left for grazing; nevertheless they eat better meat than their neighbours, as their cattle are still fed in the winter.

Game would be plentiful if there were not so many sportsmen, though they do not want for partridges,

partridges, and their quail are the best in all Spain. In marshy places, they are well stocked with wild ducks, woodcocks, and snipes. In the plains they have hares, but no rabbits, nor any deer, nor roebucks, which last the Spaniards call *corzo*, as coming originally from Corsica; as they give the name of *galgo* to a greyhound, having first had them from Gaul, as Martial says,

“Leporemque læsum Gallici canis dente.”

Lib. iii. Epig. 47.

The woods are not without wild boars; and Don Manuel de las Casas who had been minister of Marine at St. Sebastians, killed a very large lynx, (*lupus cervarius*) in that part called *las encartaciones*;* but the common wolf is scarce, there being so few sheep to entice them, and the country so fully inhabited by which means they are immediately discovered and killed. Hardly once in an hundred years one meets with a bear, though so common in the mountains of Leon and Asturias, which form a chain jointly with those of Biscay; but they have plenty of foxes, to the great annoyance of their housewives, from the havock they make amongst the poultry. Their sea-ports are well supplied with fish, every sort being better and

* The name of Encartaciones is given to a certain number of villages in the mountains of Burgos near Biscay, where they enjoy the same franchises and privileges as the people of that lordship.

and firmer in the ocean than in the Mediterranean, so that without having a very nice palate, it is easy to distinguish a bream of Biscay from one of Valencia. Oysters and other testaceous fish they have likewise in great plenty, and that delicate fish called *Sardina*, in such numbers, that you may buy a hundred for the value of a halfpenny.

L E T T E R XVII.

Reflections on the genius and character of the Biscayners.

THE Biscayners give the name of republicks to the different jurisdictions in their provinces, all which, except Orduna, their only city, and a few towns, are composed of hamlets, and lonely houses, dispersed up and down, according to the convenience of situation, in so close and intersected a country. However their houses have every advantage of distribution, consisting of a principal story, besides the ground floor, for offices, with an appendage of stables, granaries, out-houses, courts, cellars, and gardens; with orchards, meadows, and often corn-fields, contiguous to the building, with chestnut groves, and other improvements to the very foot of the mountains. Nothing can be more pleasant to the traveller, than to see houses and gardens during the whole course of his progress,

gress, particularly from Orduna to Bilbao, an extent of six leagues, which seems like one continued village. The upper part of the houses were formerly of wood, but the new ones are of stone, and one seldom sees an empty house, or any fallen in ruins; on the contrary, many new ones, both large and convenient, are constantly building; from whence it appears, that though population cannot well be considerably encreased, while new branches of industry are not introduced, all the land being occupied, it seems, rather to augment, notwithstanding the many emigrations; and though some women emigrate likewise, few remain at home without husbands. These dispersed families may be held as the most ancient in Spain, and the country is indebted to them, for population and culture. In the Biscay language they are called *Echejaunas*; that is, lords of tenements, whose ancestors have possessed them time immemorial, and will probably continue so for future ages, as selling or mortgaging is held in great disrepute. Such lands as belong to rich families, are let out to others, and as they lie under their eye and inspection, the whole is attended to, with the utmost activity; the parochial church stands in the centre of the parish, which, if too extensive, has a chapel of ease, for the conveniency of the parishioners; many of whom repair to these churches from very
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great distances, in the severest weather. Their antiquity may be traced from their dedications, which are generally to the Blessed Virgin, to St. John, or the apostles and saints of the Primitive Church; and their livings must be comfortable, from the decent appearance of their pastors.

Not only Biscay, Guypuscoa, and Alaba, but also the mountains of Burgos, are full of gentlemen's seats, known by the name of *Solares*, or *Casas Solariegas* worthy of much veneration from their antiquity; the owners of these are distinguished by the title of *Hidalgos de Casa Solar*, or *de Solar Conocido* — “Gentlemen of known property;” the most honourable appellation in Spain. They are generally strong, plain structures, with square towers; but many of the towers have been destroyed; and in the modern repairs, they have followed the fashion of the times.

The head of the family is called *Pariente Mayor*, and is greatly respected by all the collateral branches; some of these are of such high antiquity, as to be thought to have dwelled there before the establishment of Christianity, in that country, since their ancestors were the founders of the churches, had the patronage of them, and were known so far back as four centuries ago, to have, even then, been time immemorial, in receipt of the tythes; others, without any patronage, are deemed

deemed equally ancient ; many are so far reduced as to be obliged to cultivate their estates, with their own hands, yet will not yield to the others, in nobility and descent, alledging that, though some branches have been more enriched by fortunate events, yet they are all equally sprung from one common ancestor. Their names have undoubtedly passed in a lineal succession, from a more ancient date than the ages of chivalry, the establishment of coat armour, or of archives, and records ; to which they pay little attention, as of no importance to illustrate their quality, the possession of one of these houses, or the constant tradition of being descended from a former possessor, being more than sufficient to enoble their blood ; many such having shined in the annals of Spain, by the noblest deeds, which have immortalized their names more than their ancient descent. These have settled in different parts of the kingdom, while the head of the family has continued at home, in a state of simplicity, ploughing his fields, and inspiring his children, with sentiments suitable to the heroical ages : the daughters are brought up in a different manner from most other parts of the world ; here the most opulent do not disdain the management of household affairs, and every branch of domestic œconomy, with a noble simplicity, that seems to recall those glorious ages of which Homer has sung. Whoever looks for innocence,

cence, health, and content, will find it amongst the inhabitants of Biscay ; and if they are not the richest, they may be well deemed the happiest of mankind. *

It is pleasing to behold with what affability the rich demean themselves towards those who are less so than themselves, being obliged to this condescension from the natural spirit, and pride of the people, added to their education and notions of freedom. Unaccustomed to brook the least scorn, or to comply with that submissive behaviour so usual from the poor to the rich, in more refined and opulent kingdoms ; yet the common proverb of Castile, *Pobreza no es vileza*, “ Poverty is not a blemish,” has no sway here, for such are their notions of labour, and industry, that their spirit makes them consider it as an indignity to beg ; and though the women are generally charitable, which cannot fail to attract mendicants, yet these are most commonly strangers.

The country people wear brogues, not unlike those of the highlands of Scotland, tied up with great neatness, being the most useful for a slippery and

* Mr. Bowles relates, that the most opulent families make no scruple to bake, brew, dress victuals, and wash linen. For my part I cannot say I observed these circumstances amongst the opulent Biscayners, though I often experienced their open-hearted hospitality and benevolence.

and mountainous country. When they are not busy in the fields, they walk with a staff taller than themselves, which serves them to vault over gullies, and is an excellent weapon in case of assault, with which they will baffle the most dextrous swordsmen; they wear cloaks in the winter, the pipe is constantly in their mouth, as well for pleasure as from a notion that tobacco preserves them against the dampness of the air; all this, joined to their natural activity, sprightliness, and vigour, gives them an appearance seeming to border on ferocity, were it not the reverse of their manners, which are gentle and easy, when no motive is given to choler, which the least spark kindles into violence.

It has been observed, that the inhabitants of mountains are strongly attached to their country, which probably arises from the division of lands, in which, generally speaking, all have an interest. In this, the Biscayners exceed all other states, looking with fondness on their hills, as the most delightful scenes in the world, and their people as the most respectable, descended from the *aborigines* of Spain. This prepossession excites them to the most extraordinary labour, and to execute things far beyond what could be expected, in so small and rugged a country, where they have few branches of commerce: I cannot give a greater proof of their industry, than those fine roads

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they have now made from Bilbao to Castile, as well as in Guypuscoa and Alaba. When one sees the passage over the tremendous mountain of Orduna, one cannot behold it without the utmost surprize and admiration.

The manners of the Biscayners, and the ancient Irish, are so similar on many occasions, as to encourage the notion of the Irish being descended from them. Both men and women are extremely fond of pilgrimages, repairing from great distances to the churches of their patrons, or tutelary saints, singing and dancing, till they almost drop down with fatigue. The Irish do the same at their *patrons*. The *Guizones* of Biscay, and the *Boulamkeighs* of Ireland are nearly alike: at all these assemblies, they knock out one another's brains, on the most trivial provocation, without malice or rancour, and without using a knife or a dagger. In both countries the common people are passionate, easily provoked if their family is slighted, or their descent called in question. The *Chacoli* of Biscay, or the *Shebeen* of Ireland, makes them equally frantic. In Ireland the poor eat out of one dish with their fingers, and sit in their smoaky cabbins without chimnies, as well as the Biscayners. The brogue is also the shoe of Biscay; the women tie a kercher round their heads, wear red petticoats, go barefoot, in all which they resemble the Biscayners, and with them have an equal

equal good opinion of their ancient descent: the poor Biscayner, though haughty, is laborious and active, an example worthy to be imitated by the Irish.

So many concurring circumstances support the idea of their having been originally one people. It cannot be denied, but that the old Irish, whether from similitude of customs, religion, and traditional notions, or whatever else may be the cause, have always been attached to the Spaniards, who on their side, perhaps from political views, have treated them with reciprocal affection, granting them many privileges, and styling them even *Oriundos* in their laws, as a colony descended from Spain; yet, with all these advantages, if we except those gallant soldiers who have distinguished themselves in the field wherever they have served, few Irish have made a conspicuous figure in Spain, or have left great wealth to their families. *

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* Another instance in which the Irish seem to have closely imitated the Spanish customs, is in the taking of snuff, of which Mr. Howel, who was in Spain in 1620, and went soon after to Ireland, gives us the following account, at an early period, after the first introduction of snuff into Europe: "The Spaniards and Irish take it most in powder, or smutchin, and it mightily refreshes the brain, and I believe there is as much taken this way in Ireland, as there is in pipes in England. One shall commonly see the serving maid upon the washing-block, and the swain upon the plough-

The King of Spain has no other title over these free people, than that, of Lord of Biscay, as the kings of England formerly held over Ireland; they admit of no bishops, nor of custom houses in their provinces, and as they pay less duties than the king's other subjects, they were not included in the late extensions of the American commerce; however they content themselves with that renown which they have acquired for themselves and their issue, insomuch that upon only proving, to be originally belonging to that lordship, or descended from such in the male line, lawfully begotten, they are entitled to claim public certificates, or executory letters, termed *Cartas executorias*, expressive of their being *Hidalgos de Sangre*, or "Gentlemen of blood;" their nobility having been confirmed to them, by the kings of Castile and Leon, lords of Biscay, in the plenitude of their power.

The most lofty Castilians have constant rivals for antiquity and descent in the inhabitants of Biscay, Asturias, and the mountains of Leon: thus, in Don Quixote, Dona Rodriguez, the duenna, speaking of her husband, says, he was as well born
 plough-share, when they are tired with labour, take out their boxes of smutchin, and draw it into their nostrils with a quill, and it will beget new spirits in them, with a fresh vigour to fall to their work again"—*Epistolæ Hoelianeæ*. London, 1726.

born as the king, because he came from the mountains. *Y sobre todo Hidalgo, como el Rey, porque era montanes.* †

Impressed with the flattering ideas, the high-minded Biscayner leaves his native soil, and repairs to Madrid. Conscious that this blood is pure, uncontaminated with mixtures of Jewish, or Mahometan race, he raises his hopes on honest industry, and sobriety, fulfilling his duties with zeal, and submission; he often meets with relations in affluence, and sometimes rises to the highest employments. It should seem that some such character must have offended the immortal Cervantes, from his pointed reflections in his celebrated romance of Don Quixote, where he says that, “an express being arrived with dispatches of moment directed to Don Sancho Panaz, governor of the island of Barataria, into his own hands, or those of his secretary, which being given to read to the major domo, by Sancho; the imaginary governor asked, Who here is my secretary? To which one present answered, *I, sir, am the person, because I can read and write, and am moreover a Biscayner.* With this addition, replied Sancho, you are fit to be a secretary, even to an emperor.” *

LETTER

† Don Quixote, part 2. tom. 4. cap. ci. Madrid, 1771.

* Don Quixote, part 2. tom. 4. chap. c. Madrid, 1771.

L E T T E R XVIII.

Description of the town of Bilbao, and the manners of its inhabitants.

THE town of Bilbao, on the banks of the river Ybaizabal, is about two leagues from the sea, and contains about eight hundred houses, with a large square by the water side, well shaded with pleasant walks, which extend to the outlets, on the banks of the river, with numbers of houses and gardens, which form a most pleasing prospect, particularly as you sail up the river; for, besides the beautiful verdure, numerous objects open gradually to the eye, and the town appearing as an amphitheatre, enlivens the landscape, and completes the scenery.

The houses are solid and lofty, the streets well paved and level; water is conveyed into the streets, and they may be washed at pleasure, which renders Bilbao one of the neatest towns in Europe. Coaches are not in use, by which means, inequality of wealth is not so perceptible, exterior ostentation is avoided, and the poor man walks by the side of the rich, with equal ease and content.

The air is generally damp, covers iron with rust, destroys

destroys furniture in the upper apartments, extracts the salt out of dried fish, and multiplies flies beyond measure, yet the town is remarkably healthy, and its inhabitants enjoy, to a great degree, the three principal blessings of life, perfect health, strength of body, and a chearful disposition, attended with longevity; in proof of which, though the town is very populous, the hospital is frequently empty, and in nine months, that Mr. Bowles resided there, only nine persons were buried, four of which were above eighty. Every day one may see men above that age walking upright, in chearful converse with youth. Burning fevers, which the Spaniards dread so much and call *tabardillos*, are not known here, and they are seldom troubled with agues. What is then the reason that Bilbao, on the side of a river, in so damp a situation, and chiefly built on piles, like the cities in Holland, should be so remarkably healthy, with every indication against it? I shall endeavour to account for it.

The adjacent mountains stop the clouds that arise from the saline vapours of the ocean, rains are frequent, but they are seldom without a sea breeze, or a land wind; the current of the air being thus continually ventilated, never leaves the moist vapours at rest, and prevents their forming those putrid combinations, which heat generally occasions, on stagnated waters; thus the

the vicinity of the sea, the rains, and more than all, the strong currents of air, are the physical causes of its salubrity at Bilbao, as on the contrary, the continued heat which rarifies the exhalations of such rivers as have a slow motion, as well as the stagnated waters in ponds or lakes, where there is great heat in the air, and little wind, will be the causes of putrifying the vapours, and bring on fevers and other distempers. For this reason, the inhabitants of La Mancha are so subject to agues, and use as much bark as in Holland, because the air has little motion in summer, notwithstanding the country is open, and the surface is dry. In the same manner, a new house is dangerous to dwell in, where the damp vapours are confined, though one may sleep very safely in the deepest gallery of a mine, if the air has a free circulation.

To these favourable circumstances, the Biscayners owe their good spirits, freshness of complexion, and chearful disposition. In other countries, women are oppressed with the slightest fatigue; here they work as much as the strongest men, unload the ships, carry burdens, and do all the business of porters. The very felons, confined to hard labour in the mines of Almaden, do nothing in comparison with these females; they go bare footed, and are remarkably active, carrying burdens on their heads which require two men to lift up. The wife yields not in strength to the husband, nor the sister to the brother, and after a chearful

cheerful glass, though heavily loaded, they move on with alacrity, returning home in the evening, without the appearance of lassitude, often arm in arm, dancing and singing to the tabor and pipe.

Their music is defrayed at the expense of the town, after the manner of the antient Greeks. On holidays they play under the trees in the great square; the moment they begin, the concourse is great, men, women, and children, of all ages, are engaged at the same time, down to the very infants. The dances, are active, suitable to their strength, but divested of indecent attitudes or gestures. These surprising women, though constantly exposed to the air, have good complexions, with lively eyes, and fine black hair, in which they pride themselves greatly, and braid to uncommon advantage. Married women wrap a white handkerchief round their heads, so knotted, as to fall down in three plaits behind, and over this the Montera cap. They have a haughty look, and work in the fields like the men; their language is the *Basque*, which, without doubt, is original, and as antient as the peopling of the country, being totally distinct, and without any connection with any Spanish dialect; those who understand it, assure us it is very soft and harmonious, as well as energetic*.

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* In the mountains of Biscay and Navarre, the Spanish language, or *romance*, is neither spoken or understood.

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A general neatness prevails every where in the town of Bilbao. The shambles is a Tuscan building, in the centre of the town, with an open court and a fountain in the middle; nothing can be more cleanly or better contrived, free from all bad scents, or any thing disgusting as it is copiously supplied with water to carry away every thing offensive. The meat is delivered so fresh and clean, as not to require being washed, as practised in other parts of Spain, which deprives it of its substance and flavour; the veal is white and delicate, and the poultry excellent: the woods afford plenty of birds, besides five sorts of birds of

See the following books.

De la antigua lengua, poblaciones, y Comarcas de las Espanas en que de paso se to can algunas cosas de la Cantabria por andres de Poza — Bilbao, 1587, 4to.

El imposible vencido: Arte de la lengua basconcada por manuel de Larramendi. Salamanca, 1729.

Diccionario Trilingue del Castellano, Bascuense y Latin por manuel de Larramendi, 1754.

From whence it is evident that the Bascuense is totally different from the Spanish, which is the common language of the two Castiles, Leon, Estremadura, Andalusia, Aragon, Navarre, Rioja, and the mountains of Burgos; and is generally understood in Asturias, Galicia, Valencia, and Catalonia, though not the language of those provinces, where they have a dialect varying more or less from the Spanish, in proportion to their situation and proximity to neighbouring kingdoms.

of passage, called *Chimbos*, which fatten soon after their arrival, and are greatly esteemed.

Amongst the different sorts of fish common at Bilbao, there are two peculiar to that river, which the inhabitants are remarkably fond of; these are a peculiar sort of eels in winter, and the cuttle fish in summer; the eels are small like the quill of a pigeon, of a pale colour, about three inches long, and without a back bone, which they catch at low tides in prodigious quantities. In a word, every thing is in plenty at Bilbao, for besides a well supplied market, their gardens abound in pulse, and fruit of all kinds; so that one can live no where better than here, when we take into the account, the hospitable disposition of the inhabitants, which soon falls off, if you slight their cordiality, or attribute it to motives of adulation or interest. Such is the happy life of the inhabitants of Bilbao, free from the luxuries as well as the ambitious passions, which agitate the minds of their neighbours, they pass their lives in tranquility, governed by wholesome laws; amongst which they are said, even to have one against ingratitude, with a punishment affixed to it.

LETTER

L E T T E R XIX.

Reflections on the injudicious method laid down in the Spanish ordinances, for the propagation of timber, being the substance of a memorial presented by Don Guillermo Bowles, to his Excellency Don Julian de Arriaga, Minister of State for the department of the Indies and Marine.

TO judge of the quality of oak, fit for building, the four following circumstances are to be considered ; First, the situation ; secondly, the nature and depth of the soil ; thirdly, the age of the tree, when it is felled ; fourthly, the manner of laying it down to dry.

In mountainous countries, the best timber is from about midway, up to the tops of the mountains ; its goodness rather decreases, in proportion as it approaches towards the valley. In the lower parts, the trees grow quicker, and are more lightly ; but as the roots must always partake of a greater share of moisture, from their situation, which exposes them to the continual flow of water from the heights, the stem is not so vigorous nor solid ; thus a tree on the top of the mountain, will not be so large nor beautiful at sixty years of age, as another in the valley at forty ; but let the builder

der be cautious how he trusts to outward appearances, otherwise he will certainly be disappointed.

It appears from various judicious experiments, that oaks arrive at their greatest perfection, at the period of fifty years, when the soil has above two feet depth, and at seventy-five years, when the depth exceeds three and a half; if it is above four feet, they then increase in vigour and strength for upwards of a century. From whence it is evident, that trees, like animals, have their period of youth, maturity, and decay. When they cease to grow, they are come to maturity, the conductory vessels are obstructed, the tubes turn to solid timber, the sap ceasing to circulate, becomes all spine or heart, and the tree remains in a state of perfection, and rest, for a term of twenty or thirty years. This is the proper time, between adolescence and old age, to fell the tree; if it was attempted while the sap was yet in circulation, the timber would be liable to warp in hot weather, besides many other defects. We must not imagine, that though this operation was performed in the winter, or what might be thought a proper season, such as the Spaniards call a good moon, according to the opinion of the ancients† that these inconveni-
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† The ancients had a great regard to the age of the moon in the felling of their timber. Pliny orders it to be in the very article of the change, which happening on the last day of the winter solstice, the timber, says he, will be immortal.

encies would be removed. Oaks, reared from acorns, in plantations, prepared for the purpose, near villages, with the utmost care and attention, though afterwards transplanted on a mountain, will never be so perfect as those that have grown spontaneously or even originally sown there. These two allegations will shew, that the Spanish ordinance of 1748, for the planting of mountains, committed two capital errors in its decrees; for it says, "That near every village, a nursery shall be established for the sowing of acorns, manuring them every year; and when they are transplanted, the length of a foot is to be cut off from the root of every plant, while two or three feet of earth is laid round them, to make them grow faster!"* This may do very well to obtain a fine avenue in a park, or form an agreeable grove, but will never answer the end of yielding good solid timber, proper for the building of houses or ships; for, though it is certain that a tree transplanted, pruned, and well supplied with manure, may flourish, and have a beautiful appearance, yet this is obtained

* The words of the ordinance are as follow: "Que en cada lugar se senalara un vivero para sembrar las bellotas, beneficiandole con estiercol cada ano, y en el mismo acto del trasplante se cortara a cada arbol un pie de su planta, y para que crezcan con brevedad, se les arrinara dos o tres pies de tierra."—Ordenanza. De la cria y plantio de los montes. Del ano de 1748.

obtained at the expence of its constitution, by a precipitated vegetation. The intention of the ordinance was to lessen the original defect, by transplantation on a mountain; but this expedient has not power enough to correct the error arising from its first propagation; and what is still worse, a further law contributes more fully to its decay, since it ordains that “they should be pruned, in order to shoot up more vigorously, and that the straight trees, which might be converted into beams or knee timbers, ought to be improved, by cutting the points of their principal shoots.”† This regulation produces the reverse of what was intended, and is the original cause of so many hollow oaks observed throughout Spain. For this reason the white mulberry trees of Valencia, and Murcia, are generally hollow, while the black sort in Grenada is solid and healthy, because the shoots are not pruned. On the road from Tortosa to Valencia, I measured three monstrous olive trees, entirely hollow, having scarce any substance beyond the bark, and yet they bore fruit. One of them was forty-one feet in circumference. I saw others, as large, at Villaviciosa, in Portugal, which were stout and solid, because they had not been so barbarously

† The ordinance says, “Que las podas de los arboles son para que crezcan sanos: y que los arboles derechos que pueden convertirse en vaos, quillas y codastes, deben beneficiarse cortando las punta de la guia principal.”

barbarously treated: in a word, every tree used in the manner the king's ordinance directs, may thrive and grow for many years, but it will not attain to that crisis of time, between life and death, when it ought to be in a state of perfection. Cedars and firs I allow, may be excepted from this rule, as their interior parts do not run any risk from such an operation, there being a great difference between trees, whose fibres are impregnated with a balsamic and incorruptible oil, and those which draw their nurture from sap, the superabundance of which, tends to putrefaction; for the root of a tree increases, and grows, in proportion as the stem and principal branches require a greater supply of nurture. It is equally known, that the juices sucked in by the roots, are annually distributed from the stem to the branches, affording life and support to the leaves, flowers and fruit. For this reason the mulberry trees in Valencia, which are pruned every two or three years, begin to decay in five or six years, and the oak and chefnut of Biscay, which are used in the same manner for the purpose of charcoal, begin to decline, the former in ten years, and the latter in twenty, when they ought to be in their prime. On the contrary, those oaks which grow in their natural state, never transplanted nor pruned, nor receiving other ill-treatment, neither rot, nor become hollow, except by some particular accident, but

stripped off. I once asked a peasant why he did not avail himself of this second leaf, for the use of the silk worms? he answered me, that it would be of infinite prejudice to the tree, and drain it of its substance. He was right as to the fact, though his reason was bad, because the roots with their juices, support the stem, branches, leaves, and fruit. If the branches are lopped, the stem grows hollow; if the first leaves are taken off, the sap reverts, and mixes with what comes forth at a second shoot; but if you take this off likewise, then the sap recoils on the bark, and the heart, and the tree will be glutted by repletion, rather than starved by inanition, as the labourer imagines. With respect to the method of felling of timber, it should be done with particular attention to the trunk, so as to prevent a further effusion of the sap, otherwise a great part of that strength, which it affords to the tree, when it condenses, would be lost. When the tree is felled, it should be carefully placed in such a manner, that the two extremities may rest upon a prop of wood or of stone, two feet, at least, from the ground, that the air may have a free circulation. If it lies on the ground, the moisture would penetrate on one side, and it would dry on the other. Even in its raised situation, it will suffer in some degree, as its own shade will cause some alteration, for which reason the tree should be turned two or three times in the year,

year, concerning which there are excellent instructions laid down by Mr. Duchamel de Monceau, and Mr. de Buffon, the result of philosophical observations and repeated experiments. †

Many considerable advantages will ensue from a due observation of these principles, and may be
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† While we are busy in finding fault with Spanish ordinances, let us for a moment divest ourselves of prejudices, and examine the glaring impropriety of some of our acts of parliament at home. The cutting down of the oak timber in the spring of the year, when the bark will easily part from the wood, as it is now generally practised in England, is also, according to Mr. Miller, a very great absurdity, for the sap of the trees being at that time in full motion in all their vessels, the timber soon after cutting is cracked and torn in many places when exposed to the air, and will not last a fourth part of the time, as that, which is cut in winter, when the sap is thickened, and at rest; yet there is an act of parliament to oblige every one to cut their timber at that season for the sake of the bark.--See Miller's Gardener's Dict. preface to folio edition, London, 1759.

Does not the following passage from the same author, speaking of the French, breathe the spirit of a true patriot, as well as a philosopher. "They do not neglect the culture of their own useful timber trees, particularly the oak, for as they seem to be very much in earnest to improve and increase their marine, they are pursuing several schemes, which in time will enable them to carry their point. Surely then this should not be neglected in Great Britain, as the welfare of this country principally depends on its shipping and commerce."

applied to the purpose of ship builders and carpenters; from these premises we may conceive the reason, that, of two houses built by the same architect, one shall be solid, and remain in a due perpendicular, while the walls of the other shall give way by the dilatation or contraction of the beams; from hence we may perhaps be able to resolve that curious problem, which has been proposed to all the geometricians in Europe, to find out, why two ships, built by the same person, on similar principles and mensuration, with timber from the same place, and cut at the same time, one shall go like the wind, and the other shall be the dullest of failers. One shall come home tight, and in good condition, from a long voyage, and the other so leaky, that the pumps must be kept constantly going. For my part, as I conceive that the dilatation of a beam, may throw a wall out of equilibrium, I imagine that the same effects, acting upon various bodies of timber, of different shapes and dimensions, united together, and their action upon one another,* may give a new position to all the constituent parts, and a certain flexibility or inflexibility, which may have an effect on the swiftness, or slowness of its motion, through the

* The late learned Spanish Admiral, Don George Juan, published a very elaborate and scientific treatise on this subject, intituled, "Examen maritimo Teorico, Pratico, o Tratado de Mecanica aplicada a la construccion, conocimiento y Manejo de los Navios, &c."—Madrid, 1771.

the water ; and what is still worse, strain particular parts, in such a degree, as to make a ship very leaky. It perhaps may be objected, that these observations are only of moment in the northern, and moist districts, and that they are of no signification with respect to the warm and dry air of the southern provinces of Spain ; but I beg leave to assert, that they will hold good in every climate, with more or less effect, and are of course worthy of the notice of the public at large, as well as those individuals whom they may more particularly concern.

L E T T E R XX.

Description of the iron mine, and forges, at Somorrostro, in Biscay.

THE famous iron mine at Somorrostro, in Biscay, has all the appearance of being alluvial, and originally composed by the congelation of some fluid matter, increasing by insensible degrees, and reduced into a lamellated state, successively forming plates, or scales, one over the other, thinner than paper ; as is evident from the many concavities and crevices, covered over by these plates ; which supposing to be the case, we need not be surprized, at what has been advanced by
some

some of the workmen, who assure us, that they have often found broken pieces of pickaxes, mattocks, and other instruments, in places that had been worked centuries ago, and are now replete with new ore; if this is a fact, we may further believe them, when they assert, that the mine increases, though the slow progress of nature, in this operation, does not permit us to calculate its gradation, or determine the number of ages sufficient, to fill up a cavity of any given size.

From the above, it results, that a solution, evaporation, alluvion, and deposition, all exist in this mine; its situation is an undulated hill; which, viewed from the neighbouring mountains, seems almost a plain; its form is regular, and one may go round it in about four or five hours. The ore forms an uninterrupted stratum, whose thickness varies from three feet to ten, and is covered with a coat of whitish calcareous rock, from two to six feet thick. I now proceed to their method of working this mine, where every one is at liberty to dig at pleasure, and transport it by land or water, without being subject to duties or any formalities. The people being generally ignorant, and carrying away whatever comes uppermost, often take ore, which has its matrix of quartz, and is of a brittle kind, full of cracks; but the iron masters, who are the purchasers, are more versed, and know what to buy, and what to reject. It is generally
allowed,

allowed, that no iron in Europe is so easy to fuse, or so soft as that of Somorrostro. When the ore is first taken out of this mine, it has the colour of bull's blood, and when wetted becomes purple; great quantities are carried away by water, to the neighbouring provinces, where they fuse it by itself, or mix it with ore of their own, which generally yields a harder iron; I shall only speak of their process with that ore which is fused without any mixture.

The first operation is to roast it * in the open air, by piling strata alternately of ore, and wood, in order to divide the ore, repel the moisture, and diminish

* No general rule can be given, concerning the duration, or degree of fire, for this purpose, these being various, according to the difference of the ores; a few days, or even hours, sufficient for some ores, while others, such as the ore of Rammelsburg, require that it should be continued for several months. Shluter enumerates five methods of roasting ores; viz.

First, By constructing a pile of ore and fuel, placed alternately in strata, in the open air.

Secondly, By confining the pile under a roof, without lateral walls.

Thirdly, By placing the pile under a roof, without lateral walls.

Fourthly, By placing the pile in a furnace, consisting of walls and roof.

Fifthly, By roasting the ore in a reverberatory furnace, in which it must be continually stirred, with an iron rod.

diminish its weight, that it may be more easily fused, and the ferruginous parts separated from the slag: when it is sufficiently roasted, they put it in the forge, with the due proportion of charcoal, and when it appears to have fused, by leaving on the hearth, a mass of four or five arrobes, they lay hold of it with tongs, and place it on an anvil under an immense hammer, of about seven hundred to a thousand pounds weight, and there by force of blows, and moving it about, they square it, and reduce it into bars. The numerous sparks which fly off from the blows of the hammer, are no more than the scoriæ of the metal. The bar thus shaped, may be doubled or lengthened in a less forge, if they please, and even beat cold as if it was silver. In this manner the ore is fused in a few hours, and the bars formed, and sold to the blacksmiths. Formerly the iron was beat by mere strength of arm, a proof of which may be gathered from the names of many places in Biscay, situated where there is neither river nor brook, and begin, or end, with the termination *ola*, or *olea*, either of which in the Biscay language, signifies iron works, such as *Mendiola*, that is, “iron works of the mountain.”

According to appearance, a quintal of ore will produce about thirty-five pounds of good iron, and the residue about thirty pounds of slag, and dead earth. As this mine neither contains sulphur,

nor

For acids, it is not necessary to mix any calcareous substance to fuse it, in order to absorb those matters, so troublesome in mines, that have the misfortune to be loaded with them, as is often the case in France. However, it would not be amiss to use a little of it, were it only to assist the fusion of the ferruginous earth, accelerate the process, and lessen the slag, as well as the quantity of fuel. These workmen, by constant experience, have acquired the proper method of managing the ore, as well as to know the quantity of coal for the forge, which is seldom larger than that of a considerable blacksmith; so that little improvement can be made on their labours; though by several experiments, made in 1773, by the *Sociedad Bascogada*; or Biscay society, it appears that it would answer better to roast the iron, in a close chamber, than in the open air. A good forge, well conducted, will yield to the owner above five hundred ducats a year; * some indeed, hardly produce three hundred, after paying all charges. It is necessary for them to be good œconomists, with respect to fuel, and to use small forges; for if they were to have such large ones, as are common in most parts of Europe, with all the apparatus of hammers and other implements, they would soon strip their mountains of wood, and the forges would be at a stand for want of materials.

Besides

* A Spanish ducat, worth about four shillings and eight pence, English money.

Besides the mine of Somorrostro, there are several others, some of which are worked, and others not. In one near Bilbao, the ore is seen above ground. About a mile from the town, there is a mine in a hill, of a quite different nature from that of Somorrostro, being loaded with vitriol; it is an enormous mass of iron ore, that attracts the vitriolic acid, which penetrating through the ferruginous rock, dissolves the metal, and exhibits on the surface, small laminæ of green, blue, and white vitriol. Opposite to this hill, on the other side of the river, another similar rock produces a quantity of vitriol solely of a pale yellow, and though the colours green, blue, and yellow, may exist without any vitriolic acid, chemists are very well apprized from experience, that the common iron dissolved in this acid, crystallizes into green vitriol, which we call copperas, forms blue crystals, with copper, and white crystals, or allum, when united with argillaceous earth, and of the same colour when it dissolves zinc, and produces yellow, when it coagulates with the phlogiston of common sulphur, which abounds so frequently in the three kingdoms of nature. The most remarkable circumstance, is to meet these colours in the Biscay mines, which neither contain copper, allum, zinc nor sulphur; nor is it an easy matter to account for it, without supposing that the pure elementary water, has a part in composing these crystals, and that its evaporation, either by heat, or air, alters the
the

the consistency, and destroys the green colour of the vitriol of the iron, taking away that proportion of water, which constituted it, and that as soon as it loses it, it begins to change colour, and passing through the various tints of green, and yellow, terminates in white, when all the water is gone: when it is come to that state, and has a resemblance to flour, it is called sympathetic powder, on account of its styptical quality, so readily staunching the blood, in hemorrhages, and curing of wounds. Whoever chooses to verify this theory, need only to pour water on this white powder, and he will find that it crystallizes anew into green. If it be asked, why these matters do not unite, and form sulphur, when there is so much acid, and iron in these mountains, and the iron contains so much phlogiston? I answer, that for this event to take place, the vitriolic acid, and the phlogiston, should be perfectly concentrated and dry; whereas the reverse happens in these mountains, where they are so overwhelmed with moisture, that the abundance of this acid, has perhaps been the cause, of many of the mines about Bilbao, being neglected, as of course they would yield so brittle an iron. This then would be the time to use a calcareous substance, to correct this defect. It is for this reason, the Swedish iron is preferred to the Spanish, as the latter is so apt to redsear, that is, to crack, between hot
and

and cold. At a small distance from this great ferruginous rock, an engineer lately cut away a considerable part of the hill, to improve the public walks, near the town of Bilbao, and as he made a perpendicular cut of about eighty feet depth, he discovered a vein of iron ore, lying in perfect strata, which, at times, dipped in a direct line, and at others, obliquely, bearing some similitude to the roots of a tree, occasionally of an inch diameter, or the size of one's arm, with infinite variety of ramification, according to the more or less resistance of the earth, to the passage of water; there being no doubt of this mine being alluvial. Here the very circumstance has happened, which Don Antonio de Ulloa, judiciously imagined, would follow in the great hill of Potosi, were it possible to lay it open and examine its contents.

It appears therefore, that the mines of Biscay are in veins, strata, and masses. The *Hematites*,* so frequently seen in the hollow parts of the veins, are remarkable for their different sizes and forms; when

* Hematites, or blood-stone, is a hard mineral substance, red, black or purple, the powder of which is always red, sometimes of an intermediate figure, and sometimes spherical, semi-spherical, pyramidal, or cellular, that is, like a honeycomb, consisting of pyramids generally small, the apices of which, appear in a transverse section in the centre. It contains a large portion of iron; forty pounds of this

when broken, every grain was found to have the shape of a star, which proves solution, deposition, and a slow crystallization. These hematites are exceedingly heavy, and if calcined give proofs of containing two or three times more iron, than the ore of Somorrostro, but of a brittle and intractable nature. Besides these hematites, there are in this mine, many cavities of different sizes, from two inches to two feet, lined with a great deal of ferruginous matter, from one to three fingers thickness; this coating appears to be a true emery, and from hence, issue cylinders of striped hematites, as large as the feathers of a pigeon, two or three inches long, not unlike a hedgehog; others have various and fanciful appearances, that would make objects of singular curiosity in the collection of a mineralogist, or in a cabinet of natural history. I deduce from the whole, that iron is soluble by pure water, and its vapour, as much as by salts. Therefore, we need not be surprized at meeting even pure iron in some mineral waters. Iron ores vary so much in their forms, that more properly they have no determinate one, as sometimes they are earth, stones, or grains; accordingly those

this metal have been extracted from a quintal of the stone, but the iron is obtained with such difficulty, and is of so bad quality, that this ore is not commonly smelted. The great hardness of hematites, renders it fit for burnishing and polishing metals.—Dictionary of chemistry, translated from the French. London, 1777.

those naturalists, who attend only to the external forms and appearances in classing of minerals, have been obliged to multiply the names of the ores, calling them ores in the form of peas, beans, coriander seeds, pepper corns, cinnamon, &c. which Mr. Cramer, not without reason, treats as ridiculous trifles. †

LETTER

† Dictionary of chemistry.—As in Navarre, and some of the southern parts of France, they smelt iron ore, in small furnaces, after a method similar to that of Biscay, a description of their works by the ingenious translator of the dictionary abovementioned, may perhaps not be unacceptable.

“The furnace consists of a wide mouthed copper caldron, the inner surface of which is lined with masonry a foot thick. The mouth of the caldron is nearly of an oval or elliptic form. The space or cavity contained by the masonry, is the furnace in which the ore is smelted. The larger diameter of the oval mouth of the cavity is about eight feet, and its small diameter about six: the space of the furnace is gradually contracted towards the bottom, the greatest diameter of which does not exceed six feet. Eighteen inches above the bottom there is a cylindrical channel in one of the longer sides of the caldron and masonry, through which the nozzle of the bellows passes. This channel, and also the bellows pipe, are so inclined, that the wind is directed towards the lowest part of the furnace. Another cylindrical channel is in one of the shorter sides of the furnace at the height of a few inches from the bottom, which is generally kept closed, and is opened occasionally to give passage to the *Scoriae*; and above this is a
third

L E T T E R XXI.

Observations on the Copper Mine of La Platilla, in the lordship of Molina.

THE remarkable hill of La Platilla, which name it has had time immemorial, is about two leagues to the north west of the city of Molina, capital

third channel in the same side of the furnace, through which an iron instrument is occasionally introduced to stir the fluid metal, and to assist, as is said, the separation of the scoriæ from it. The greatest height of the channel is at its external aperture on the outside of the furnace, and its smaller height is at its internal aperture, so that the instrument may be directed towards the bottom of the furnace; but the second channel below it has a contrary inclination, that when an opening is made the scoriæ may flow out of the furnace into a basin placed for its reception. When the furnace is heated sufficiently, the workmen begin to throw into it alternately charges of charcoal and ore previously roasted. They take care to throw the charcoal chiefly on that side at which the wind enters, and the ore on the opposite side. At the end of about four hours a mass of iron is collected at the bottom of the furnace, which is generally about six hundred weight. The bellows are then stopped, and when the mass of iron is become solid, the workmen raise it from the bottom of the furnace, and place it, while yet soft under a large hammer, where it

capital of the lordship of that name, on the river Gallo, thirty one leagues from Madrid. The mountainous country in which it is situated, forms a chain of hills, where an intense cold reigns nine months of the year. Here the waters of rivers divide; the Gallo runs towards the Tagus on one side of the hill of La Platilla, and on the other, the waters fall into the Ebro.

The summit of this hill consists of whitish rock, marked with blue and green spots, and is about half a league to cross over from one valley to the other, the ascent being equally steep on both sides. It appears on further examination to have been formerly a mass of vitrifiable rock, that has decomposed into small stone, pebble, sand, and earth, which with decayed leaves, and roots of plants, form

is forged. The iron produced in these furnaces is of the best quality; the quantity is also very considerable, in proportion to the quantity of ore, and to the quantity of fuel employed. In these furnaces no limestone or other substance is used to facilitate the fusion of the ore. We should receive much instructions concerning the smelting of iron ore, if we knew upon what part of the process or circumstance the excellence of the iron obtained in these furnaces depends; whether, on the quality of the ore, on the difuse of any kind of flux, by which the proportion of vitreous or earthy matter, intermixed with the metallic particles, is diminished; on the forging while the iron is yet soft and hot, as the Marquis de Courtevron thinks, or, on some other cause not observed."

form that crust of earth which now covers the rocky part of the hill.

In the mine, there are pieces of white quartz, which rise above ground from thirty to fifty feet, full of fissures in every direction; they gradually decay towards the bottom, and form into fine sand and earth. If any one compares the decomposition of this quartz, with the phenomena of its transformation under ground, it is clearly discovered, that new bodies are formed there; for in the galleries of the mine, perpendicular fissures, are not found in any uniform order, but a multitude of them, dividing the rocks without regularity, each division afterwards subdivided into numberless smaller fissures, some of which are scarcely perceptible. The copper ore is formed in the interstices, between these fissures, being blue, green, and yellow, mixed with a white limy earth. The largest fissure I saw was about three inches, and others only the breadth of a hair. Some have the superficies only, covered with a thin blue, or green lamina, others are spotted, partly blue, partly green, with all the gradations and tints from the sky blue to the lapis lazuli, and from a light, to the deepest green. In some parts the aperture of the stone is totally filled, and forms a body equal to the breadth of the fissure; but whatever be the size, it is always composed of parallel lamina, as thin as an eggshell, and successively deposited one over

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the

the other, by the water, which makes it indubitable, that this mine is alluvial; first formed by the decomposition of the rocks, their recombination and moisture.

This lamellated metal is composed of various plates, which I call primeval, some are chequered with small hollow round grains, hardly seen with the lens, which I conceive are formed by bubbles of air, at the time of the decomposition of the rock, and the forming the drivel of the metal. These bubbles impress their figure on the lamina above, and occasion those beautiful grains, from whose variegated waves in the concentrical lamina, results that beauty of colour in the stone, when polished, which surpasses those of the east, and would stand unrivalled, were its hardness, equal to the peculiarity of its shades.

Having examined one of these lamina, of a line in thickness, I found it to consist of three and twenty leaves, the white calcareous earth was formed by the drivel of the copper, at the instant of decomposition, and always follows it, covering the ore, as well in the green, as in the blue, and yellow, and when this white earth abounds, then the green ore is of a very pale hue. Breaking a piece of the ore, fissures are seen in the centre full of a green or yellow matter, and if there is any cavity, there are small blue crystals, like fragments of sapphires; others, green like emeralds, and true rock crystal, blue,

blue, or green *. I broke one of these crystals that was fixed in the hollow part of a rock, and was solid without. It was as green as an emerald, in the centre, without the least appearance of crack, or crevice, exteriorly; which I put into an acid, when all the green matter dissolved, and the crystal remained perfect and entire, except a small cavity in the centre. To explain the forming of this crystal, it is necessary to suppose that the copper and calcareous earth were formed by the decomposition of the rock, by some interior labour, and that the limy part mineralized the copper, and covered its atoms, without any communication of acids, fixed or volatile alkali, sulphur or arsenic, for the matter being calcined does not yield any smoke, neither emit a sulphurous smell, and exposed to the air many years, does not decompose, acquire taste, or change colour.

When I find this calcareous earth closed within the fissure of any solid rock, and any part of it mixed with the mineral, while the remainder serves for its matrix, and that there is no other similar earth thereabouts, I conclude that the aforesaid calcareous earth is formed by the decomposition of the

P 2

rock

* Mr. Bowles says, that they are not sapphires, nor emeralds, as those two stones will dissolve in acids; (*a fact which cannot be admitted*) like the green or blue colouring parts of rock crystal, and that those of this mine will not dissolve.—Introduccion a la hist. nat. &c. page 197.

rock which it is in. I say the same when I meet quartz mixed, and united with the rock, for on breaking it, the stone may be perceived half decomposed, with some part of clay in the centre. Various stalactites are found in the excavations from this mine, which if well considered, prove the origin and diurnal formation of the copper, and decomposition of the rock; one evidently perceives the mineral begins to be dissolved, and fluid, or at least in a mucilaginous state, as its waves demonstrate its flowing in a very gentle manner; but when rain water has forced a passage through the crevices, and meets with that kind of metallic drivel, before it is thoroughly dry, or acquired a sufficient consistence, it carries it forward, till it comes to some cavity, and there, drop by drop, it deposits it, and forms the stalactite, sometimes like a hollow reed, with bubbles in it, occasioned by the air, but more frequently solid, from the viscosity of the matter. I observed, by analysis, that those stalactites of the most perfect green, contain six eighths of pure copper, and two eighths of calcareous earth; they are smooth, hard, and without smell, and do not decompose either in the air or boiling water; but the green, blue, and yellow stones, found here, are the reverse of the stalactites, dissolving in the weakest acid. I do not call these blue, and green stones, crystals, because they are not so, though they have that

appear-

appearance, as is proved by experiments; nor do I say, that the green is a *malachite**, it not being yet decided, whether this is a green vitrifiable stone.

In the cracks formed by the decomposition of the rocks, there is a great deal of cinereous and yellow clay, particularly where there is the most mineral. These clays seem to precede the formation of the white and yellow calcareous earth, whose quantity is always equal to that of copper; so that if one is abundant, the other is so likewise, and vice versa. This yellow earth deceived me at first, having a notion that its mixture with blue, formed the green ore, remembering to have seen the dyers compose their green colour, by an assemblage of yellow and blue, and that the physical cause of the greenness of leaves, proceeds from the mixture of those two colours; and finally, that there are several plants, indigo, for example, whose juices are destroyed by fermentation, and the blue colour remains in the *feculae*; but in all this I was mistaken, as the blue ore does not mix with the green, they being of different natures; for the blue appears, by experiments, to contain a little arsenic, silver, and copper, which, when fused, forms a kind of bell metal; but the green

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ore

* Copper mixed with gypsum, or plaster, Green. Is found at Ordal, in Norway, and there called Malachites. — Cronsted, sect. cxcvi.

ore has not the least atom of arsenic, and the copper mineralizes with the white earth abovementioned, without having the least part of iron. This mine of Platilla, being of an adventitious nature, has no great depth, and lays in strata. If the miners go deep, they are deceived; for though the mine may dip, in a slight degree, which perhaps in a thousand years might form a rich vein, the ore is discovered, at present, from three, to forty feet depth at furthest.

Many have thought that mines are only found in barren districts; but this is an error, that of La Platilla is a proof of it; for though the ore is so near the surface, the ground is covered with plants. The same happens in the quicksilver mine at Almaden, where they shoot up even within the precincts of the furnaces, in the same manner as in other places, where no mines are to be found. In that of La Platilla, where the veins are arsenical, and not above a foot of earth over the ore, the following trees and plants are constantly seen; the oak, holm, cistus, hawthorn, juniper tree, sage tree, dwarf cistus, base horehound, bell flower, ragwort, cornflag, orchis, Bethlem's star, *muscari*, or fair haired hyacinth, milkwort, and above thirty other species, which grow in cornfields, or meadows, on the road side, and even on the sea shore. The low lands are covered with the same sort of grass as the rest of the country, and serve for pasture

pasture to those numerous herds of cattle for which the territory of Molina is famous.

These observations occur in different kingdoms. The mines of Sainte Marie, are covered with oak, fir, apple and pear, cherry and plumb trees, with good pasture and corn, in a soil, about two feet in depth, covering the most sulphurous arsenical rocks, of silver, copper, and lead mines in Europe, where the very veins are often seen above ground. An equal fertility reigns near the mines of Clonsthal, on the mountain of Hartz, belonging to Hanover, with excellent pasture. The same happens on those of Freyberg, in Saxony, that are covered with barley, in June; it being a singular sight, to see a body of people, reaping the corn over the heads of a thousand miners below, busy in digging out passages, and blowing up rocks, full of arsenic, and sulphur. Some mines, without doubt, are found under bare rocks, though this barrenness does not proceed from any mineral vapour, but from different causes, and chiefly, that, moisture, heat, and cold, have more power on some rocks, than over others. This is the case with the great mountain of Rammelsberg, at the foot of which stands the imperial city of Goslar, so famous for its silver mines, where the loosened stone may be observed to crumble away, and be covered with moss, and verdure: insomuch that though the period is not yet

yet arrived, for its entire decomposition, soon, or late, it will happen, and be covered with grafs, in the same manner as the mountain of Hartz is at present.

✧ About a quarter of a league from the city of Molina, there is a spring whose waters have a smell like rotten eggs, from being impregnated with sulphur and alkali : those who have analyzed them, assures us, that they are of the same nature with the springs near Gibraltar, and the waters of Cotterets, in France, and equally useful in cutaneous complaints. The river Gallo abounds in salmon trout, from half a pound to four pounds weight. About a quarter of a league from the town, the river contains a fine white earth mixed in its waters, which incrusts the earth and such plants as it touches, with a limy substance, though the water appears clear and limpid.

LETTER

L E T T E R XXII.

The source of the Tagus and its environs described.

IN going from Molina de Aragon, to the westward, you cross over mountains filled with petrifications, which appearance lasts for two or three leagues. At the third league there is a salt spring which serves the people of Molina. The ascent is continual, through a wood of fir, and over mountains, till you reach the village of Peralejos on the banks of the golden Tagus, so often sung by the poets, so frequently extolled by historians.

At Peralejos, the Tagus is only fifteen paces wide, and one foot deep. The petrifications are observed again in the village, and the river runs through a narrow channel it has made for itself, between two lofty mountains of marble, perpendicularly flitted near a hundred feet high. Each mountain is a solid block, without either horizontal, or perpendicular fissure, if we except those casual crevices, occasioned by the enormous pieces which now and then detach themselves, and roll down to the banks of the river. Such as have tumbled down on the south side, have crumbled into

into good earth, and as the water filters through them, the soil is fertile, covered with grass, and different plants, such as purging buckthorn, service, Spanish cherry, black briony, agrimony, pimpinel or common anise, and butterwort sweating drops of water. The opposite mountain is bare, without moisture, earth, plant, or moss, being a stupendous rock resting on a bed of marble, mixed with white gypsum, veined with red, and prismatical stellated spots.

About three quarters of a league to the southward of Peralejos, you meet the highest hill in those parts called Sierra Blanca; its top is capped with calcareous rock, its body of white stone not calcareous, decomposed in the same manner as the former, with veins of imperfect jet, of the thickness of one's finger, with soft grainy pyrites † of the colour and odour of those found in the clays of Paris. Veins of bituminous wood extend from a finger to a foot in thickness, and contain pieces of

† Pyrites is a mineral resembling the true ores of metals in the substance of which it is composed, in its colour or lustre, in its great weight, and lastly, in the parts of the earth in which it is found, since it almost always accompanies ores. From the property of striking sparks from steel, they have been called Pyrites, which is a Greek word signifying fire-stone; they were formerly used for fire-arms as we now use flints, hence it was called carabine stone, still by some marcasite. Perhaps no other kind of natural body has had so many appellations. Persons curious to know the

of jet, as large as one's head, others less, but always with vitriolic pyrites, dispersed in the very substance, and interstices of the jet. It seems clearly to be wood, as some pieces have still the bark on, exhibiting the knots, fibres, and other parts, with little alteration, still preserving their ligneous original, mixed with that, which composes the true and solid jet. What is still more extraordinary, veins of a lead mine are likewise found in it, following the oblique, or direct crevices of the wood, while other veins of lead traverse its fibres, in a perpendicular line, as well as horizontally, and some small lumps are fixed in the very substance of the wood. In a word, the four principal orders in mines, may be observed here in a small compass, as it were in miniature, viz. perpendicular veins, cross veins, strata, and masses. These veins are the more extraordinary, if we consider the manner in which the metal must have introduced itself into the timber, for it cannot be said to have made its way through the pores, when the lead was in a fluid state, because pieces of wood are found, whose exterior parts do not shew the least particle of lead, yet on breaking them,

the other names less used, may find them in Henekell's *Pyritologia*; we think with that celebrated chemist, that the subject has been perplexed by this multiplicity of names, for before his great and excellent work, the notions concerning Pyrites were very confused and inaccurate.—Dictionary of chemistry.

them, some portion of this mineral is discovered within, which could only introduce itself there; when the sap first formed the wood. The country people in this neighbourhood burn this wood, and make shot of the lead, that runs from it, which serves to kill hares, partridges, and other kinds of game, with which the country abounds. The source of the Tagus is about a league from the hill of Sierra Blanca, in the highest situation of Spain, for the waters of this river run down to the ocean, and those of the Guadalaviar whose source is contiguous, fall into the Mediterranean. The waters called *Vegas del Tajo*, are at a league and a half from hence, in a valley, formed by the river, which has its source in a copious spring, called *Fuente de la Abrega*. This brook, for here it deserves no better appellation, meanders so often, that it must be crossed four times in the space of half a league. Many have thought the source of the Tagus was at *Fuente Garcia*, which is five leagues higher up, but Mr. Bowles assures us to the contrary, adding, that *Fuente Garcia* is a trifling spring, which he covered with his hat, being no more, than a small quantity of water, collected in the trunk of a hollow tree, placed there to hold what issues from a puddle of standing water, which three paces further, loses itself in the adjacent valley, without a drop of it reaching the Tagus.

Half

Half a league from *Fuente Garcia*, there is a salt spring which supplies the town of Albarracin, and eighteen villages, in its jurisdiction, with salt. The country from hence to the true source of the Tagus, is an elevated plain, rather uneven, with a good carpet of grass, and a great many brambles, whose berries afford an ample repast for the black birds. It is also well stocked with that tree called in Spain *Cedro Hispanico*, the juniper thurifera of Linnæus, a tall stout tree, with berries like the juniper tree of the large sort *. The snow remains on the ground in these cold regions, until June, and the country is a continued chain of hills, known by the name of the *Sierra*, replete with various singularities. From Peralejos hither, different petrifications are found, sometimes in the rock, and at others in the earth. If the sea deposited

* The juniper thurifera, or Spanish juniper, is an evergreen, little known out of Spain, though it might be of much use; it grows very high, and is similar to the juniper tree, we have in England, but the berries are larger than those of the species we have. I was informed in Spain, by a gentleman to whom I am indebted for many communications in the course of this work, that Dr. Ortega, who has visited this country, had assured him, we have it not in England; probably the climate of Spain is more favourable for its growth. Mr. Bowles calls this tree *Cedro Hispanico*, but makes it synonymous with another tree, by saying *Cedra Hispanico* o *Alerce*, whereas the *Alerce* is the *pinus larix* of Linnæus.

posited them there, it would be difficult to explain how this should have happened in the highest situation in Spain.

To return to the Tagus : this noble river passes by the royal palace of Aranjuez, the city of Toledo, Almaraz, and Alcantara in Estremadura ; then enters Portugal, at Abrantes, and rolls its waters with dignity into the ocean at Lisbon. Philip the second opened the navigation of this river ; the first boat dispatched by his majesty, arrived at Aranjuez, from Lisbon, on the 19th of January, 1582, and then returned to Toledo, to proceed down the river again * ; but successive events, and an alteration of dominion under Philip the fourth, put a final period to these improvements. The ancient poets have been lavish in their praises of the Tagus ; Silius Italicus, says,

“ Ore excellentem et spectatum fortibus ausis
Antiquâ de stirpe Tagum, superumque hominumque
Immemor.”

Faria de Sousa, in his history of Portugal, relates, that king Dennis made a rich crown and scepter with the gold found in the bed of this river. Many people are still employed near Toledo, in these researches, after floods, and have collected

* Dichos y hechos de Don Philippe 2^{do}. por Balthazar Porreno. Madrid, 1748.

collected a great number of gold coins and trinkets †; though Don Antonio Ponz insinuates, that he looked in vain there for gold sand, and seems to think, that enough of it, had never been found to purchase a pair of pigeons in the market.

L E T T E R XXIII.

*Mine of Cobalt, in the valley of Gistau, in the Pyrenees of Aragon.**

THE valley of Gistau is almost on the summit of the Pyrenees, for very near it, at *El Hospitalet*,
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† Many of these curiosities had been collected by Don Francisco Santiago Palomares, of Toledo, who dying in 1775, his library and cabinet was purchased by his excellency Don Francisco Lorenzana, and presented to the public library, lately erected in that city. Another similar collection was left by Don Juan Antonio de las Infantas, dean of Toledo, to the college of St. Ildefonso, at Alcala. — Viage de Espana, por Don Antonio Ponz, secunda edicion. Madrid, 1776.

* The kingdom of Aragon was formerly united to that of Navarre, and continued so till 1203, when Sancho the Great, who had married the heiress of the county of Castile, divided his dominions amongst his children. Garcias, the eldest, had Navarre, Ferdinand had Castile erected into a kingdom, and united to that Leon, by marriage with Sancha, only daughter and heiress of Bermudo, last king of Leon. Gonfave had Sabrarve and other territories, and to Ramiro, his natural son, he gave the kingdom of Aragon,

the waters of France and Spain divide. The river Cinca has its source here, and, passing by Plan, falls into a gully, two hundred feet broad, between two rocks perpendicularly open, above a thousand feet high, and then passes on to the Ebro, which it enters at the lowest part of Aragon. These two rocks are like walls, where one plainly perceives the waters have forced a passage through, as the different coloured strata of stone, are similar, and exactly opposite to each other, on both sides.

The mountain of Plan is of an extraordinary height, made up of five or six hills, piled one upon another, whose divisions are in proportion to the more or less resistance of the rocks, and the quantities of earth brought down by the rains, or high winds. In the month of June I went into France, through the valley of Aure, § explor-
ing

gon, with the consent of the queen, in recompense for his bravery, in offering to support her innocence by single combat, against the king's sons, who had charged her with incontinency; the falsity of which accusation, was discovered by a monk, who revealed their confession to the king, on which the queen's innocence was proclaimed, and the combat laid aside, as is fully related by Roderic Archbishop of Toledo. — "Roderici Toletani de Reb. Hisp. Lib. v. chap xxv.

§ This is Mr. Bowles's itinerary, which is preserved entire in the course of this letter.

ing my way over those craggy hills which had then above five feet of snow. There are a great many bears, as well as roe-bucks, which are hunted by the people of the country, and now and then they meet with the lynx. The mutton is excellent. I bought a sheep for a dollar, (3s. 6d.) and had it dressed with *chenopodium pirenacum*, "wild spinnage" which is found in great plenty on these hills, where I shivered with cold, in the dog days, and saw a great many white partridges, but not a single fly.

There are three lead mines and one of copper, in the neighbourhood of Plan, and a good iron mine at Bielsa, which is worked with much judgment: also much lime rock, and gypsum, as white as snow, and large lumps of grey granite, dispersed in the bed of the river Cinca, where there is no sand, but stones of this kind, from the largest to the most diminutive size. One likewise finds grit stone of the same grain and colour, as that on the mountain of Elizondo in Navarre, and a great deal of millstone; the best of these are generally at the top of the mountain, being the hardest and most compact, better even than those in the centre. One should always prefer those with visible, and deep pores, and small cavities, as the heat arising from the friction, is by this means dispersed over the whole mass. This is the sort found at Gistau. Those that are smooth grained, generate too much heat, which has an effect on the flour. The soft ones

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are the worst of all, requiring constant repairs, and soon wear out, besides the inconvenience of rendering the bread gritty.

Having made some experiments at Plan, on some lead ore, I found in a flaty mountain, called Sahun, I discovered it to be mixed with white spar, and so abundant and easy to fuse, that it left fifty pound of lead per quintal, notwithstanding that the plane had not a sufficient declivity, for the metal to run off, as it ought to do.

The environs of Plan abound in fir, oak, and beech, of which they make charcoal for the mines; and here one finds that extraordinary mine of Cobalt, † which has not its equal in Europe, except that famous one at Shoenberg, in Saxony, for whatever is found in other places is mixed in
arsenical

† Ores of cobalt resemble those of antimony; their surface is almost always covered with an efflorescence, of a dingy scarlet. These ores contain a good deal of arsenic, and it is from them that arsenic is usually got; they also frequently contain a portion of bismuth. Those which contain cobalt alone, are very rare: Cobalt mines bring in a considerable revenue to Saxony, where the ores are worked with a good deal of intelligence.—Beaume manual of Chemistry.

✎ In the year 1755, Mr. Bowles was ordered, by the court of Spain, to attend his Excellency Don Joseph Augustine de Llano, to the manufacture of Zaffre, at Gingemback, in the Black Forest, in Germany.

arsenical veins of lead, or silver, and in such small quantities as not to deserve any particular notice. I shall now relate the particular circumstances I was informed of, concerning this famous mine at Gistau.

At the beginning of this century, a person having observed, that some stone, found in a steep mountain, situated to the North East of that, of Plan, was more heavy than usual, it induced him to suspect, it might be silver ore, on which he repaired to Zaragossa, and shewed it to a person conversant in mines; but after various fruitless essays, no silver was found; at last they discovered it to be a mine of cobalt, and some specimens of it were sent to the manufacturers of Zaffre, in Germany, where, finding it, on trial, to be good, they determined to get possession of it, without apprising the Spaniards of its value. To carry on this scheme the better, a German was sent into Spain, to conclude this business with the simple Aragonian, and it was agreed upon, between them, that the Spaniard should petition his court for a grant of the mines of the valley of Gistau, on ceding to the king, a certain quantity of lead, yearly, at a low price; on which condition the grant was easily obtained; none suspecting that these mines contained any other mineral. A private agreement was further entered into, between the German and the Spaniard, that the lat-

ter should yield to the former, all the cobalt they might get out of the mine, at the price of thirty-five *pesetas* per quintal, gross weight.*

The people of Aragon, understanding little of mines, Germans were sent for, and they began to extract the cobalt, which they found about half way in the mountain, on whose summit there was another mine, called after Philip the IVth, perhaps from its having been attempted in his reign, though I do not know what ore it contained, but suspect it to have been cobalt; which, not being much known, at that time, nor its uses in commerce, † was soon after abandoned, no silver

* A *piseta*, or pistreen, is a silver coin, worth about tenpence sterling.

† This ignorance of the value of cobalt is not peculiar to the Spaniards; the same happened in Germany, where we are informed, that, for want of a sufficient knowledge of mineralogical science, quantities of rich ores, and fossil substances, have been formerly thrown away amidst the rubbish. There is scarce a mining country, in which they have not, some time or other, paved their highways with stones, and rocks of value; I know, from very reputable authority, (says a German writer) that, this was formerly the case of the cobalt ores in Hesse, which at present, produce an annual revenue of about £14000. sterling, clear of all expenses. “ Raspe’s preface to his English translation of Baron Born’s travels through the Bannat of Temeswar, Transylvania, and Hungary, in 1770. London, 1777.

ver appearing, which, was probably their object; but I am surprized they should have filled it up again, when they left the other mines of copper, and lead, open, which are in the very same place.

The Germans, for a long time, got out of this mine about five or six hundred quintals per annum, sent it from Plan to Toulouse, where it was embarked on the canal of Languedoc, and then by Lyons and Strasburg, forwarded to their own manufactures. After they had, in a manner deflowered the mine, and got as much ore as they could easily extract, it was probably no longer an object of interest, and then they abandoned it, which happened a few years before I arrived there, in 1753.

Impatient to visit this mine, I went to it immediately on my arrival at Plan, and found many shafts in all that part of the mountain, for as cobalt does not run usually in veins, the Germans had tried different places, wherever they thought they could get it most readily. On examining these shafts, I found several pieces of good cobalt, of a finer grain, and the blueish grey colour, lighter, than that of Saxony. I cannot give an idea of it, to those who have not seen it, nor teach them, to distinguish it from other metals, of the same colour, as without ocular inspection,

specification, explanations are to very little purpose; however, I shall just add, that most of the lumps of cobalt I found here, were contiguous to a kind of hard slate, as glossy as if they were varnished, with spots, of the colour of a dried rose, without touching the cobalt, though it was as much exposed to the moisture as the slate: nor have these rose-coloured spots, either grown livelier, or paler, during the many years I have had them in my cabinet. These spotted plates may serve as a direction to such as are employed in search of this mineral; for my part, I could not make any further observations with exactness, as the exclusive charter was still in force, and they watched my motions with jealousy, therefore was obliged to be satisfied with the observations I had made, without excavations, and quitted Spain about that time.

Should the Spaniards ever think seriously of Cobalt, as it exists in this mountain, and probably in other parts of the kingdom, as well as in America, I shall add the following directions for its discovery, not intending it for the use of chemists by profession, who are not in any need of it, but only for miners, who have never seen any Cobalt, or for such, who, having no judgment in ores, conclude that all matter which is weighty, and yellow, must certainly contain gold, silver, or other precious metals.

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If the heavy grey stone which they find, is united with the glossy black slate abovementioned, there is no doubt, but that it is cobalt, of which that slate is the blend. If the stone is quite detached from the slate, draw lines on it with a pointed iron, and if the lines appear to be black, it is a strong indication of its being cobalt: for greater security, break the stone, and reduce it into powder, put it into a thin glass phial, for the thinner it is, the less liable to break; then place it in an iron vessel, filled with sand, so that the neck of the phial may be open, and the bottom not in contact, with that, of the vessel, then put it into a common kitchen oven: all the arsenic will evaporate at the neck of the phial, and the cobalt will be purified. After this process, it still preserves its grey colour, and, mixed with sand, and the ashes of soda and barilla, is what the Saxons call *zaffre*; this mixture is made, because sand and quartz, are infusible, without the assistance of barilla, or fixed alkali; but with it, they soon vitrify, and communicate the same property to the cobalt. If this *zaffre* is melted with a vitreous fritt, it changes into a blue glass, called *smalt*, when in masses, and *azure*, or *enamel blue*, when reduced into a fine powder, used by painters, for that beautiful blue on porcelain, and in other manufactures.*

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* Mr. Bowles in a note finds fault with the Encyclopedie, and

In the essays made on Spanish cobalt, in Germany, it appeared to be entirely free from foreign matter, and so rich, of the blue colouring earth, that it imbibed three or four times more sand or quartz, than, that of Saxony. About the year 1746, it was a great fashion, in Paris, to make sympathetic ink. I set about making of it, as well as the rest, and gave nine livres* for a pound of Spanish cobalt, with which I made my ink, which was more esteemed than any they had seen, the green colour being much more lively, than if made with the cobalt of Saxony. The Spanish mineral has not even the grey colour of the Saxon, but is blue, like melted lead, in-
 so-much that in several manufactures, and parti-
 cularly

and other writers on chemistry, for saying, that the cobalt and zaffre of the East, are nearly exhausted, and that we have no foundation for such an assertion, and ought rather to apply the inferiority of their modern colouring, to their craft, on finding us so easily satisfied. But the principal reason given by these writers, is, on account of the considerable quantity of zaffre and smalt now exported from Europe to China, which Mr. Bowles takes no notice of. Zaffre has been thought of such use in England, that the society for the encouragement of arts, manufactures and commerce, promised in 1755, a premium of 30l. for making the most and best zaffre, and smalt from English cobalt, not less than 5lb. weight of zaffre, and 15lb. of smalt to be produced before the society, with satisfactory certificates.

* About seven shillings and six-pence sterling.

cularly that of Count Aranda for delf-ware, at Alcora, in Valencia; they use it without any other preparation than pulverising the stone, as it is taken out of the mine, and with this blue powder in its natural state, they paint the ware without further process. §

LETTER

§ Cobalt has been found in Cornwall and Scotland, and probably in other parts of Europe, of various colours and hues, mixed with different substances, which mineralists have fully described, particularly Cronsted. Wallerius enumerates six different species thereof. If well calcined cobalt be treated with inflammable matter, and fluxed like other metallic calxes, it will be reduced to a semi-metal, called by Mr. Brandt, of the Swedish academy, who first produced it, *regulus of cobalt*. This regulus, and also the calx of cobalt, amongst other singular properties, makes sympathetic ink, by being dissolved in aqua regia. This ink may be applied to the drawing of landscapes, in which the ground and trees are destitute of verdure, being first drawn with Indian ink, giving an appearance of winter; but those parts covered with this preparation, resemble the spring, on being exposed to a gentle heat, when the green leaves appear on the trees, and the grass in the fields, which idea has been executed in France by an ingenious artist on a fire-screen; and as a solution of regulus of cobalt, or of zaffre, in spirits of wine, acquires a reddish colour by application of heat, more variety may still be introduced in the landscape, and fruits and flowers suddenly brought out by the red solution, at the same time that the leaves and verdure appeared with the green.—Dict. of chemistry.

L E T T E R XXIV.

Observations on alum, with some account of an alum mine near the town of Alcaniz, in the kingdom of Aragon.

THE method of refining alum, seems at present to be totally neglected in Spain, though they have accounts of such works having been formerly carried on, particularly near Carthagena, of which nothing remains but the name of the village, which is *Alumbre*, the Spanish word for alum; but, supposing them to have been once acquainted with this process, they have now entirely lost it; and notwithstanding they have so rich a mine of it in the kingdom of Aragon, near the town of Alcaniz, belonging to the knights of Calatrava; yet the people of the country content themselves with digging it out of the earth, and selling it to the French in its primitive state, who refine it, and then send it back to the Spaniards, to be sold to the dyers at a considerable profit.

Chemists know very well, that the vitriolic acid is dispersed in most bodies all over the world, and is extracted out of many of them for sale, particularly from sulphur. Every body knows, that,
alum

alum is a cryſtallizable ſalt, compoſed of vitriolic acid, united with a white argillaceous earth, which many have taken for the reſiduum of burned plants, and in ſupport of their opinion, mention Italy, as an inſtance, where the moſt alum is found; being a country formed by volcanos, as appears from the number of its calcined ſtones, ſulphurs, pumice, and lavas, and thus attribute the origin of alum to fire, like that of ſal-ammoniac: without adopting or refuting any particular ſystems, I ſhall only add, that the alum of Alcaniz, is found in a low ſwampy and blackiſh ſoil.

The argillaceous earth, of which alum conſiſts, is weakly united to the vitriolic acid, for the ſalt of tartar, liquid, or ſolid, volatile alkali, ſalt of ſoda, calcareous earth, &c. diſſolved in water with alum, eject the clay from the vitriolic acid, and ſubſtitute themſelves in their lieu, forming new ſalts, more cryſtalline, whiter, harder, and drier, than alum itſelf, but experience teaches, that they are of no uſe in the dye-houſe, as the clay only, has the power of fixing the colouring particles, and giving them that brilliancy ſo pleaſing to the eye; for when it is mixed with any of the other above-mentioned matters, the water grows turbid, the clay precipitates, and becomes viſible, the other foreign earth taking its place; for which reaſon, the purer the alum, and the leſs impregnated with
other

other bodies, it is the more proper for the dyer, and renders the colour more glossy and lively.

The alum of Aragon has the advantage of being entirely free from any foreign matter; consequently is the best for every purpose, superior even to that of Rome, and only requires to be cleansed from casual impurities. Its salt is found already formed, in the earth like nitre, and other common salts, in the nitreous and calcareous earths of Spain; nothing more being necessary to refine it, than a simple lixivation, to filter, and clear it from the impurities of the earth.

This lixivium is put into boilers, and evaporated over the fire, till a thin scum appears on its surface, like a cobweb; the liquor is then run off into other vessels, where, as it cools, it crystallises into larger or small masses, the form being of no manner of consequence.

After this is performed, to save the salt still dissolved in the remaining liquor, they sprinkle this liquor over the earth, prepared for the lixivium, by which means, none of the alum is lost. Perhaps if the earth which has gone through this process, was to be heaped up, in the same manner as that, out of which they get saltpetre, it might again produce a fresh stock of alum, by some interior labour of nature, with the assistance of
water,

water, and air, for the kingdom of Aragon abounds with nitrous soil, from whence they get excellent saltpetre, as is evident by the gunpowder of Villa Feliche, the most famous in Spain. If any of these workmen would set about making experiments in this manner, with aluminous earth, should it happen to succeed, it would be of great service to the people of Alcaniz, who are at present in a starving condition. I shall not enter further into the properties of alum, which have been fully described, by chemical writers, particularly Mr. Maquer, in a memoir read at the academy of sciences in 1762, and such as are desirous to be fully informed of the nature of these works, will find in the memoirs of the French academy of sciences, for 1750, a description of the famous alum works of Solfatara, in the kingdom of Naples, by the Abbe Nollet: those of Toifa, near Civita-vecchia, in the Roman state, have been accurately described by the Abbe Mazeas, in the fifth volume of memoirs of foreign members of the same academy. And with respect to the subject at large, Mr. Monet, in his treatise *De la alunation*, has collected every necessary information for a perfect knowledge of the subject: an object of consequence to commercial people, and has always been attended to, by enlightened nations. England, Sweden, Flanders, and Italy, are the countries where alum is principally found;

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to say nothing of its use in medicine, I shall only add, that it is so material an ingredient in commerce, for dying and colouring, that without its assistance, neither of these branches can be tolerably performed, it being as serviceable and necessary upon stuffs, as gum water and glutinous oil are in painting.

L E T T E R XXV.

*Remarkable depository of fossil bones, seen near the
village of Concud, in Aragon.*

THE village of Concud is about a league distant from the city of Teruel, in the kingdom of Aragon, situated on a hill of calcareous rock, degenerated into hard earth; and though it now appears to be very uneven, it seems to have been formerly rock which the rains have destroyed by degrees, in proportion to its greater or less resistance. Going out of the village of Concud, towards the North, you ascend three small hills, and then come to the *Cueva Rubia*, “The Red Cave,” so called from a species of red earth, which the waters of a gully have laid open. This hill is about two hundred paces long, thirty broad, and eighty in depth. The top of the hill is of calcareous rock, more or less hard, in strata, of
two

two or three feet breadth, full of terrestrial and aquatic shells, which appear to be calcined. In the centre of the same rocks, there are bones of oxen and horses, asses teeth, and other bones of lesser domestic animals. Many of these bones seem preserved in the same state as those found in cemeteries; others seem calcined; some are solid; and other sorts are pulverized. The thigh and shin bones of the human race are seen with their cavities full of a crystalline matter. The horns of cattle are mixed with these, and other bones of different articulations, white, yellow, and black, confusedly jumbled together, in some places there being seven or eight shin bones of men, without the least regularity or order.

These bones are generally found in a bed of rock about three feet thick, decomposed, and almost converted into earth, with a strata of superincumbent stone, from fifteen to twenty feet thick, which serves as a cover to the hill, the bed which contains the bones, rests upon a mass of red earth, and rounded lime stone conglutinated with sand not unlike pudding-stone. A similar congeries is seen at the bottom of the gully, and the adjacent hills are of plaster-stone. On the other side of the gully, and near it, there is a cave blackened by the fires of shepherds, where there are bones, in a bed of hard earth, above sixty feet high, covered with different strata of rock, corresponding exactly with

with those on the other side; which shews that, what may have been carried away by the waters, was exactly the same as the mass that remains. The chain of hills at this place, five leagues from Abbarracin, and eight from the source of the Tagus, produces the thorny restharrow*, two species of wormwood, two of santoline, southernwood, French lavender, eryngo, sage, and thyme, and wherever they dig, bones, as well as aquatic and terrestrial shells, are found, in masses of hard rock, four feet broad, and eight long; some firmly fixed and rivetted therein, with so hard and smooth a grain, as to admit polishing like marble. At a musket shot from the gully, there is a hill of rock, which is crumbling into earth, where an infinite number of bones and teeth is found, at two feet depth, but no further. In some places, the ossified substance is entirely decayed,

* *Ononis spinosa*. Linn. Thorny restharrow. Notwithstanding Linnæus makes the thorny restharrow only a variety of the other, and, from the observations of Læfing, in the *Flora Prussica*, says it becomes thorny in the autumn; yet with us they seem to be a different species; they are seldom found together, and the corn restharrow, without thorns, hath never been observed to become thorny. The smooth sort is sometimes pickled as samphire. A decoction of the roots has been recommended in cases of stone and jaundice.—Dr. Withering's botanical arrangement, vol. 2d, page 444.

ed, nothing remaining but the impression of the bones on the stone, in the same manner as it frequently happens with shells. The finding of these bones in hard rocks, and of such different gradations or conversions into earth, of various forts, and colours, all disposed in regular strata, indicates a decomposition and recomposition, so that the hills in reality consist only of two beds, one of limestone, divided into different strata, and the other of small rounded stone, consolidated with sand and calcareous earth. In this latter part there are no bones, nor shells, which are only to be found in the first division, the variety of colours being purely accidental.

It is as singular to find shells, not petrified, in these rocks, as to meet with them, petrified, or the impressions of them, near Teruel; but it is still more surprising to find rocks almost entirely composed of aquatic and terrestrial shells, confusedly huddled together, and mixed with small bones, in a thin bed of blackish earth, beneath other beds of rock, and yet not to meet with such bones in any other part, either higher or lower, sometimes above fifty feet deep.

They tell you of an entire skeleton having been discovered, but this is much to be doubted, for though many bones are white, and well preserved, none are found that correspond, or belong to each

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other,

other, in that whole range of extensive ossification. These bones must have been separated from their respective parts, by some accident difficult to be accounted for at present: according to their actual position one would imagine them to have been conveyed there, by some fluid, either water, or mud: some seem to have slid horizontally from thirty, to sixty feet, which destroys all ideas of an earthquake; others have stuck fast in a bed of mud, about two feet from the surface, which by degrees has hardened in the air, others have remained on the surface, and turned into limestone; finally, many fragments of bones and shells mixed in this mud, have dried up, and become the most considerable part of the rock.

For many leagues round, the rocks are merely superficial, having always underneath, either soft earth, gypseous, or detached stones, cemented with other matter, which accounts for the facility, with which the waters form so many gullies, and little flat hills, as are seen in different parts of this country. It is probable however, that those beds of earth were not so soft formerly, otherwise the waters would have made greater ravages, than they actually have done; though at present the destruction is great: there being many living witnesses, who recollect the astonishing progress of some of these gullies, as well as the commencement

ment of others, which at present are small, but, may one day acquire a considerable depth *.

Objections perhaps may be started, to what has been offered, relating to the decomposition and recomposition of matter, and some may even alledge, that such bodies were always one, and the same, which is contrary to experience, and ocular demonstration. In such case, they would find

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them-

* These rocks at Concud seem to contain bones similar to those, found in the rock of Gibraltar, large pieces of which being examined by the best anatomists in England, no human bones were discovered, and they were supposed to be bones of sheep; many of them were filled with crystallized matter. It would be an object of no small curiosity to ascertain, if possible, what animals these bones of Concud did once belong to.

Some large bones, supposed to be of elephants, were found in 1778, upon throwing up the new road near the gate of Toledo, at Madrid, and an account of them was inserted in their gazette; they are now placed in the royal cabinet of natural history at Madrid.

See a curious account of some fossil bones discovered in the islands of Cherso, and Osero, by the abate Fortis, in his travels into Dalmatia, translated from the Italian. London, 1778, 4to.

Dr. Mesny, physician to the military hospital at Florence, has lately published a treatise on some bones found on the banks of the Arno, in Tuscany, which are thought to be the bones of an elephant, or some unknown animal. The Doctor told me, when I was at Florence in 1777, that they pretended to have found the skeleton of an elephant entire.

themselves obliged to allow that minerals, spars, crystals, &c. do not form anew, and that there is no such event in nature, as decomposition and recomposition: A principal not to be supported by any sound arguments. We need only open our eyes, and examine those enormous oyster shells, seen on the surface of the earth, between Murcia and Mula, where the soil evidently appears, to be formed by the reduction of lime rock, into calcareous earth, these shells having fastened themselves there, when that matter was in a muddy or dissolved state, and become afterwards calcareous earth; it being evident, they were not always in the state they are in at present. Let us then suppose, this earth to have hardened in the course of time, which is not improbable, and to form rock or granite; who will deny, that a decomposition, and recomposition must have happened? It is not possible indeed to produce witnesses of the fact, because the life of man is too short, and the information received from our predecessors, too defective for that purpose; to which may be added the slow and incomprehensible progress of nature, imperceptible to human observation. We are therefore still very much in the dark, relating to these bones, as well as, with respect to our knowledge of fossil substances in general; having yet to ascertain, a more accurate discovery, of their

their former natural situation, as well as the true origin of the mountains, and strata of earth in which they are found*.

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* "Philosophers, antient and modern, (says a late writer) have hitherto considered mountains, in general, from a point of view, too confined, or entirely different from that of mineralogy and mining; being unimproved by the light of volcanos, and by that extensive knowledge, which they might have reaped, in the deepest mines, or on the highest mountains, and from the instruction of unscientific miners, they stuck only to their libraries, and to the uppermost crust of the earth, which they had an opportunity of examining, without any great trouble to themselves, in the most pleasing countries, and in the most superficial quarries of sandstone, limestone, and slate. We are not to wonder therefore, that orology, or the science of mountains, is so little understood amongst the learned, and that the descriptions of the higher mountains of Peru, Teneriffe, Switzerland, and different parts of Europe, are generally filled with meteorological observations, botany, and other accounts, which leave their very nature, in a mineralogical, and orological respect, full as unknown, as they were before. The consequence was plain, that, general conclusions have been too rashly drawn, from a single kind of mountains, and that, the pretended systems, of the origin of mountains in general, are, for the greater part, so very romantic, and superficial."—*Travels through the Bannat of Temeswar, Transylvania and Hungary, by Baron Inigo Born, translated from the German, by R. E. Raspe. London, 1777.* See preface, page xxix.

END OF THE FIRST PART.

their former natural situation, as well as the true origin of the mountains, and limits of earth in which they are found.

It is not possible to give a full and accurate description of the mountains of Spain, as they are not only of various heights, but also of various forms, and are situated in various parts of the country. They are not only of various heights, but also of various forms, and are situated in various parts of the country. They are not only of various heights, but also of various forms, and are situated in various parts of the country.

P A R T II.

L E T T E R I.

Don Guillermo Bowles's journey, by order of Government, to inspect the mine of Almaden, in La Mancha, describing his new method of extracting the quicksilver from the ore of that mine; with some account of the use made of quicksilver, by the Spaniards, in the silver mines of Mexico, and Peru.

IN the year 1752, I received orders, from the ministry, to inspect the rich quicksilver mine, at Almaden, in La Mancha. Our first stage, from Madrid, was to Getafe, and from thence to Toledo. The waters of the Tagus are very good here, and mix well with soap, though they are bad at Aranjuez, on account of their union with limy and saline particles, in that part of the river. From Toledo I proceeded to Mora, through a well cultivated valley, and from thence to Consuegra, passing forwards by the Puerto Lapiche, Daimiel, and Miguelturra, to the village of Carascal. Hitherto the country is well cultivated, but further on, the plains are filled with holm trees,

trees, privet, rosemary, southern wood, and furze with white flowers, as far as Zarzuela, and from thence to Almaden, forty-one leagues to the westward of Madrid. Here the face of the country is totally altered, and now becomes mountainous.

The quicksilver mine of Almaden is the most curious and instructive, with respect to natural history, as well as the most antient we know of in the world. Theophrastus, who lived 300 years before Christ, speaks of the cinnabar of Spain; and Vitruvius, who lived under Augustus, mentions it likewise.

Pliny says, this mine was in the province of Bætica, as it really is, Almaden being the last village of La Mancha, and only divided by a brook, from the kingdom of Cordova. He further tells us, it was always locked up, by the governor of the province, and never opened, but by express command of the Emperor; and when the quantity wanted for Rome was taken out, was instantly shut again; but since their dominion, every thing has been so altered, and overturned, that no traces are left of their labours.

The two brothers, Mark and Christopher Fugger, of Augsbug, had a grant of this mine, and were to furnish the king, yearly, with four thousand five hundred quintals of mercury, but
no

not being able to make good their engagements, or for some other reasons, best known to themselves, they gave it up in 1635, as well as the silver mine of Guadalcanal, which was likewise in their hands, yet these Germans made such a fortune in Spain, as to leave great riches to their heirs, who now flourish in Germany, raised to the highest dignities, being counts of the sacred Roman Empire, and possessed of considerable estates in the circle of Suabia; † their opulence was so conspicuous as to become a proverbial expression in Spain, *Ser rico como un Fucar*, "To be as rich as a Fugger," a simile we find in Don Quixote. There is a street of their name in Madrid.

The church, with great part of the village of Almaden, consisting of above three hundred houses, stands upon cinnabar, and the inhabitants are chiefly supported by the profits of the mine, which lies in a hill of sandy rock, forming two inclined planes, with a craggy rock on the summit, studded

† The family of Fugger is descended from John Fugger, a citizen of Augsburg, in 1370, father of Jacob, who, from a merchant, rose to be a counsellor to the Emperor. His sons, Ulric and George, were made Barons of the sacred Roman Empire, by the Emperor Maximilian, in 1504, and their descendants were afterwards raised to the exalted dignity of Counts of the Empire. They have immense property in the circle of Suabia, are divided into several branches, and allied to the greatest houses in Germany.

studded with specks of cinnabar, which, no doubt were the first tokens that led to the discovery of the mine. In other parts of the hill, small beds of slate appear, with veins of iron which on the surface follow the direction of the hill. Some improperly call these superficial veins, for there are such in the adjacent hills, where no cinnabar was ever suspected to exist, and all the country abounds in mines of iron; what is more, in the very mine of Almaden, pieces are sometimes found, in which the iron, quicksilver, and sulphur, are so mixed together, as not to form a different body. This destroys the common opinion, that iron amongst metals, is the only one, indissoluble by mercury, the fallacy of which I have further experienced in the quicksilver mines of Hungary, where it is certain there is a mixture of iron ore, and I have seen in the quicksilver mines of the Palatinate, a great part of ironized mineral serve as a matrice to cinnabar,

The neighbouring hills are of a similar kind of rock to that of Almaden, and furnish the same sorts of plants, which shews that cinnabar does not exhale those poisonous vapours some have imagined, nor are they obnoxious either to vegetation or mankind. A miner may sleep in security on a stratum of cinnabar, and I have counted above forty sorts of usual plants that thrived and run to seed

feed within the precincts of the twelve furnaces where the mineral is roasted.

The felons who work there, feel no inconvenience from it, and do nothing more than wheel about the earth in barrows, yet many of them are so crafty, as to counterfeit paralytic and other complaints, to impose on the benevolent disposition of those, who visit the mine. Each man costs government eight reals per day, (about two shillings) they are better fed, than any labouring man, sell half their allowance, and enjoy good health; yet from a principle of compassion, are only made to work three hours a day, and the public think their condition so infinitely wretched as to be little short of death.

The very judges on the bench must be of that opinion, when they affix this punishment to the most atrocious crimes, yet they are deceived,* and may be assured, every labourer in Almaden does of his own free will double the work of these felons, and for half the profit.

In this mine, two veins, from two to fourteen feet broad, run the length of the hill, with branches shooting out into various directions. Every

* Mr. Bowles follows on this occasion the opinion of Don Antonio de Ulloa, in contradiction to the experience of all ages.—See Dr. Robertson's history of America, vol. 2d, note lxxxi.

ry one knows that the sand-stone is composed of grains of different sizes, the stone of the vein is the same as in other parts of the hill, and serves as a matrice for the cinnabar, which is more or less abundant in proportion to the fineness of the sand stone, on which account some lumps of the vein will contain to the amount of ten ounces of quick-silver in the pound, and others only three.

The two principal veins are attended with those upper and lower strata of rock, generally observed in all veins, to which miners have given the names of the roof, and the floor. At Almaden they are of black and rotten slate, and I have occasionally seen in them a quantity of cinnabar, and large round, or flat pyrites, yellow and sulphurous, which, being broke with the hammer, exhibit within small particles of cinnabar. The pyrites decompose and dissolve, which occasions that vitriolic moisture which shews itself in yellow spots on the linen of those who enter the mine; and as it comes out with lemon juice, it is evident they are martial pyrites. There was one of these in the King's former cabinet, that weighed sixty pounds; I collected some of three pounds. Besides pyrites they also find in the mine, pieces of white quartz, richly ramified with cinnabar, and light spar, sometimes even crystalline, both filled with the same matter, either lamellated or in the form of rubies. There is also slate, full of them, and the chert,

or *hornstein* of the Germans†, is studded with cinnabar like nail heads: even pure and native mercury is seen in the crevices of slate and sandstone §.

From the best information I could get, the heirs of the Fuggers rented this mine till 1645, when the King took it into his own hands, and the German miners

† Chert. *Petrofiliex*. *Lapis corneus*. Cronsted, sect. LXIII.

§ Though native cinnabar has ever so lively and red a colour, it has always a mixture of argillaceous, or calcareous earth, or of sand; and these substances are frequently impregnated with an arsenical taint. Even mercury, though with so pure an appearance, may yet be loaded with a pernicious vapour; for which reason, I think that native cinnabar should be banished from the shops. At the foot of a steep mountain, near San Felipe, in Valencia, I made excavations, and at the depth of twenty-two feet, found a hard, white, calcareous earth, containing drops of fluid mercury. This earth, being washed, in a neighbouring fountain, left twenty-five pounds of pure mercury, which was sent to Madrid, and deposited in the royal cabinet of natural history. A little above the spot where the mercury was found, there were petrifications and gypsum. From exact researches, we know that a bed of cinereous clay, two feet below the surface, extends the length of the city of Valencia, from East to West, replete with drops of mercury, which were discovered after repeated experiments in digging of wells; particularly in the house of the Marquis of Dosaguas. Thus we found it in a white calcareous earth, with petrifications, at San Felipe, and behold it in the city of Valencia, in a cinereous clay, without them!

miners were dismissed. The next year the crown allotted forty-five thousand trees to support the galleries of the mine, but the workmen reaped no advantage from it, the timber having been employed without art or ingenuity. The same year Don Juan Alonzo de Bustamante established the reverberatory furnaces with alludels, the Germans having only used retorts, of which many fragments are still to be seen amongst the rubbish.

The direction of the hill of Almaden is from north east to south west, having about 120 feet elevation. I went its whole length in four and twenty minutes, and its breadth in fourteen. Like most of the hills in La Mancha, it is composed of two plains, whose summit forms a peak of craggy rock, but the upper part has not that perpendicular elevation it seems to represent, for it forms an inclined angle of fourteen degrees, and all the smaller rocks of the hill have more or less the same inclination. We shall next see, that a due observation of these circumstances, constitutes a principal branch of the art of mining.

The stone on these hills, as well as on the superficies, as in the centre, is of the same nature as that of Fontainbleau, and the pavement of Paris: on calcining it, and examining it minutely, when it comes out of the furnace, the grains of sand are found to be of the same shape and transparency with

with those on the sea shore. The enormous pieces of rock which compose the internal part of the mountain, are cut with vertical fissures, and though the rocks seem to have an erect position one over the other, the length of the hill, this is not the case, for they all incline to the south.

Two veins more or less impregnated with cinnabar, cut the hill almost vertically, and form those strata which we have said were from two to fourteen feet broad; these unite on the most convex part of the hill, stretching as far as one hundred feet, from which happy union arose that prodigious richness of mineral called *del Rosario*, which has given many millions of quintals of quicksilver, and was in my time the occasion of that dismal fire in themine.

A bed of rock two or three feet broad, runs from north to south, across the hill, and cuts the two veins, so that further on, there is no appearance of cinnabar. This kind of rock being prior to the forming of the ore, stops the mineral vein, which finding it so hard, cannot penetrate that way, and is obliged to turn out of its direct course. It is from this rock to the other extremity of the mine, that I said I went in fourteen minutes. If the veins ran without interruption, and always on a straight line of the same breadth, less trouble and art would be necessary in the working of mines.

Let

Let us now speak of the method of working these of Almaden before my arrival there.

The miners had never sunk their shafts according to the inclination of the vein, but had made them perpendicular, letting themselves down by pullies in buckets, from which awkward contrivance arose all the mischiefs that followed, for in proportion as they went deeper, they often lost the vein, and were obliged to open a new shaft with the same inconveniences, and thus went on, continually encreasing their shafts and galleries with similar defects, by which they not only lost a great deal of labour and time, but were deprived of a free circulation of air underneath, as that which rushed in at one part, immediately made its escape at the other, next to it, and the people were suffocated below; the same would have happened in a stone quarry, as well as in a mine: moreover, the great number of galleries, filled with quantities of decayed and rotten timber, produced obnoxious vapours, and made a hanging vault of the mine, replete with danger, from the large pieces which continually tumbled in; to prevent these inconveniencies in future, I laid before the ministry the following proposals.

That a new mine should be opened lower down, and a general shaft sunk obliquely, following the direction of the vein, and leaving a staircase at every

every twenty feet, to go up and down. That two galleries should be extended on the vein, one to the right, and the other to the left, continuing them in proportion as the shaft went deeper. That a space of three feet should be left on the vein, between one miner and another, in the nature of steps which the French call *travailler en banquette*. By this means a file of workmen, from twenty to a hundred, might be placed commodiously, and go as deep as they pleased without danger, because the new excavations are supported with the stone and rubbish dug out of the mine, the props which serve for this purpose being solid, and not liable to the same inconveniencies as timber.

The same should be done in the second vein, and they might continue their labours at pleasure; when they go deeper, a gallery for a communication of air, must be made from one vein to another, by which a constant circulation is kept up through the whole, as is always practised in well regulated mines.

My plan was well received by the ministry, miners were sent for from Germany, and the whole was tolerably executed. About this time the Cinnabar mine of Guancavelica, in Peru, had begun to decay, after supplying the mines of that kingdom for above two centuries past with a prodigious

digious quantity of quicksilver *, that of Almaden only furnishing Mexico, for which purpose they generally extracted five or six thousand quintals per annum, but the ministry finding it was necessary to send more to Peru, ordered a large quantity to be provided, so that from Almaden, and Almadenejos, they extracted about eighteen thousand quintals per annum, but the greatest part came from the mine worked by the Germans.

The Fuggers were the most experienced men of their age, and their shafts and galleries were according to the strictest rules of art; but they never undertook any thing very great, perhaps only considering themselves as occasional tenants, therefore endeavoured to get as much as they could at the cheapest and easiest rate, concluding their harvest would be short. They appear to have directed their views where the ore was richest, which they soon after quitted, to go upon others, for we find above six hundred galleries of theirs, propped by timber, as a temporary support, which they knew could not last.

Let us now speak of those furnaces invented by Bustamante, so perfect that no alteration has been thought necessary to be made in them to this day.

The

* The mine of Guancavelica was first discovered in 1563. See Noticias Americanas. Entretenimunto physico historico por Don Ant. de Ulloa. Madrid, 1772, 4to.

The form of the furnace is fimilar to that of a good lime kiln *, only that the chimney is placed on the anterior wall, that the flame may fspread itfelf equally every where. On the lower part of the furnace, they firft lay a ftratum of the pooreft fort of ftone, containing the leaft mineral fubftance, over this a better fort, with the fweepings and dross, in which they fufpect there might be fome mercury, to which they add water, making it into a pafte, and laying it on the top. Then, a little lower down, they fet fire to the furnace, with faggots of terebinthinus, lentifcus, cyftus, rofe-mary, and other shrubs which abound in the neighbourhood. The upper part of the furnace is covered with earth, leaving eight apertures of fix inches diameter, where a file of eight aludels are placed, properly luted in an inclined pofition, and terminating at a fquare chamber, where the quick-filver is received. The fire penetrates the ftone, and heats the fulphur, by which means the mer-

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* In the memoirs of the academy of fciences of Paris for 1719, there is a circumftantial account of thefe furnaces, by the celebrated Bernard Juffieu, and it will not be amifs to confult the *Dictionnaire des arts & metiers, par Jaubert*. Mr. Bowles, in his dedication to the king, fays, that the mine at Almaden had been rendered ufelefs by a conflagration till he put it in repair, which fixed him in the fervice of that crown, and afforded him the opportunity of vifiting fo many parts of the kingdom.

cury dilates; and as both are so volatile, they escape together, through the aludels; but the sulphur, being more penetrating, exhales in the chamber, and even works into the aludels, and the composition with which they are luted, while the mercury, from its weight, condenses, and in its passage cools, when it falls into the tub placed to receive it. From hence it follows, that if the furnace is good, all the quicksilver in the stone, must be found in these tubs, there being only this objection against it, that the fire is not active enough, to burn all the sulphur, rarify the mercury, or extract it out of the stone; or, that the fire, being too violent, does not allow time for the metal to condense, but hurries it, united with the sulphur, so that it escapes from the aludels. To try whether either of these inconveniencies happened, I made the following experiments, before the governor, and several other persons of rank.

I caused some pounds of stone, burned in the furnace, to be pulverized, and then mixed them with the nitre and charcoal, then fired them, covering them with a vessel, previously wetted with water, to receive the vapour. As nitre, and charcoal united, burn with extraordinary violence, it is evident, that if, in this mixture, there had been the least grain of quicksilver, it would necessarily

cessarily rarify and condense against the sides of the moistened vessel. In effect, we did observe some mercury there, but in so small a degree, that it was hardly perceptible with a lens, and of course of no consequence; for in every fusion of ores, some minute particles will escape in the scoria.

To discover if any grains of mercury were lost in the air, I placed four large copper vessels, not tinned, in four different places, one on the eight inches of earth, which covered the furnace, whose aperture is about three feet and a half diameter, others on the first aludels, which are the hottest, another at the obtuse angle of the same, where the mercury condenses, and the other at the highest part of the chimney, in the chamber, where the aludels lead to: as it is known, with what quickness mercury unites to all metals, except iron, if it exhaled at any of these places, where the copper vessels were fixed, it would have appeared on the copper, for I left them there above twelve hours, at the expiration of which, not the least particle of mercury appeared.

In the precincts of Almaden, there are twelve furnaces, called The Twelve Apostles; each can receive about 200 quintals, including good and bad stone, which in three days will produce about 40 quintals of quicksilver. Three days more are required

required to repair the furnace, and replace every thing properly, so that four out of the twelve, are always in action, the violent heats of the summer excepted, when a suspension from labour is unavoidable.

When we reflect on the advantages of these furnaces, they must be considered as objects of the greatest utility and honour to Spain, foreigners having likewise improved from them. The Hungarians have imitated them in their mines, by which they have considerably reduced the number of workmen, employed in the old method, with retorts. Foreigners are shewn every thing without reserve,* and are permitted to examine the rocks

* Mr. Ferber, in his travels through Italy, speaking of the quicksilver mines of Idria, in Friul, belonging to the house of Austria, says, "They consider here their common melting and ustulation of the mercurial ores, as an arcanum, and accordingly do not allow any stranger to examine their sublimation house, though even its exterior form undoubtedly, and at first sight, proves their method being the very same as that which is used at Almaden, in Spain, and has been very minutely described by Mr. Jussieu, in the memoirs of the French academy; this method is far from being perfect, and above any improvements, but probably they do not think so, else there could be no possible reason for this mystery in so common a manipulation: nothing is more opposite to the progress of science, and even to the interest of states, than so singular a reserve." *Travels through Italy in 1771 and 1772, by John James Ferber. London, 1776.*

rocks at their leisure, and even make drafts of the furnaces, and see their method of packing-up the quicksilver in goat-skins, which is certainly the best policy, to facilitate the operations of a mineral that, perhaps, one day or other we may be in want of ourselves.

Let us enquire into the five or six thousand quintals of quicksilver, sent yearly from this place to the Mexican mines; though my account should not be entirely exact, it will come as near as is necessary in points of this nature. Many of the mines of New Spain are worked by fusion, but where fuel is scarce, or the ore very poor, they amalgamate it with quicksilver; it must be allowed the Spaniards were the first who undertook this process in 1566; it is true, it was in use in the gold mines of Hungary, but this had no connexion with the works of the Spaniards, because in Hungary, the ore either appears to the naked eye, or is perceived with a lens, and as every body knows that quicksilver mingles with gold, it was natural to suppose, it could be extracted by this method; but none before the Spaniards ever thought of mixing quicksilver with a stone, containing invisible silver, dissolved with sulphur, and arsenic, and oftentimes mixed with copper, lead, and iron. They therefore discovered an ingenious mode of reducing a poor ore to an impalpable powder, and to form a mass of about twenty-five quintals, mixing

mixing it afterwards with salt, or green copperas, and with lime, or ashes, reduced to a fine powder.

These bodies, however, being of a different nature, would remain in perpetual rest, without a dissolvent to put them in action, for which purpose, they are sufficiently sprinkled with water, throwing in thirty quintals of mercury, at different times, taking care to stir it about constantly, for the space of two months. The fixed alkali of the ashes, and lime, dissolved by this means, works in the acid of the salts and copperas, which intestine action causes a violent effervescence and heat, by which means the sulphur, and arsenic, absolutely dissolve, and destroy the copper, lead, and iron. Then the imperceptible atoms of silver, escape from their confinement, are collected by the quicksilver, which amalgamates with them, and form that substance or paste the Mexicans call *pinna*. *

By

* The most perfect silver extracted from the ore at the mines is in that form, which the Spaniards call *pinna*, which is a lump of silver extremely porous, because it is the remainder of a paste made up of silver dust and mercury, and the latter being exhaled, leaves this remainder of the mass, spongy, full of holes, and light. It is this kind of silver that is put into different forms by the merchants, in order to cheat the king of his duty, &c.—See the process of the ore from the mine to this kind of cake or mass.—“Voyage to Peru, performed by the ship *Conde* of St Malo.” Written by the chaplain. London, 1759.

By this process they collect one and a half, or two ounces of silver from every quintal of ore, from which, according to the method practised in Europe, they would not defray workmen's wages.

I cannot ascertain with precision the quantity of mercury lost in this operation, as the accounts of miners are so varied and incorrect on this head; the most probable conjecture, is, that they lose as many ounces of mercury, as they obtain ounces of silver, so that an ounce of mercury delivered at Mexico, becomes nearly of the same value as an ounce of silver.†

LETTER

† The 18000 quintals of mercury, mentioned above, are disposed of in the following manner; 12000 sent to Mexico and New Spain, 2000 to Guatemala, and 4000 to Lima; Peru furnished the remainder from its own mine of Guancavelica. According to Barba, who was parish priest of Potosi, in 1637, mercury was first used in the mines in 1574, and down to his time, the royal office had received 204700 quintals of mercury, exclusive of the great clandestine import. Escalona in another work, declares that before 1638, it appeared by the public accounts, that the produce of the silver amounted to 395.600.000 pesos, which in 93 years, the time it had been discovered, amounts to 41.255.045 pesos per annum; from whence may be conceived the wealth of the mountain, and though it has not of late been so productive as formerly, yet it is still very considerable.—See “Voyage to South America, undertaken by command of the king of Spain, by Don George

Juan

L E T T E R II.

*Itinerary of Don Guillermo Bowles, continued, from
Almaden to the city of Merida, in Estremadura.*

INTENDING to make a tour into Estremadura, I set out from Almaden towards the north west, as far as Zarzuela, then, instead of continuing the road to Madrid, I went to the westward, crossing a chain of hills which divide La Mancha from Estremadura. These hills are covered with rosemary four or five feet high, privet, several forts

Juan and Don Ant. de Ulloa, translated from the Spanish.
London, 1758.

The following is an account of the Spanish mints in America, as they stood in 1777.

Mexico coins annually, about	-	18.000.000	pesos.
Lima	-	9.000.000	
Santiago de Chili, chiefly gold	-	8.000.000	
Popayan and Santa Fe together	-	12.000.000	
Guatimala	-	2.000.000	
Potosi	-	10.000.000	
Sonora in California. New mint established in 1778, uncertain	-	-----	
		59.000.000	pesos.

Fifty-nine millions of pesos, at 4s. 6d. each, - £.13.775.000 sterling per annum.

forts of the cistus with lavender leaves, elm leaves, rosemary leaves, and two other species: Also a great deal of lavender, thyme, and dwarf cistus, and though the cistus is of no use to the bees, they draw so rich a store from the other plants with which the country abounds, that hives are numerous every where in these parts. From these hills you descend to the village of Guabaguela, where the good pasture begins for the Merino sheep, the grass being plentiful and fine. The hills are chiefly covered with oaks, which become hollow by the imprudent manner in which the branches have been lopped; however they produce abundance of acorns for the swine, which are all black hereabouts. The principal revenue of the country gentlemen, consists in pasture, honey and wax. They have studs of brood mares, and a breed of cows, which all over Estremadura are whitish or red. It is seven leagues from Guabaguela to Alcocer, over an uneven ground, watered by a great many springs. You next come to Tallarubia, whose district is level, and proper for pasture. The rocks of sand or quartz are seen no more, but many loose pieces of each lie scattered on the surface of the ground; the rocks have perpendicular laminated fissures, some thin, others thick, which seem to demonstrate their successive decomposition into arable land, and the same happens with the quartz rocks
on

on the hills. The flaty rock is composed of argillaceous earth, and fine sand, and from them, when they decompose, comes that fine sand seen in the brooks, and on the sides of the road, the water carrying away all the argillaceous earth, which does not cling fast to the roots of shrubs, or trees. Some rocks hereabouts, are apparently as hard as the Egyptian Basaltes, and of the same colour, and nature; nevertheless they moulder away like the rest, and turn into earth. In the midst of this vitrifiable country, the calcareous stone begins to form itself, and is seen dispersed up and down, on the surface, like patches.

The pastures called *Debias de la Serena*, are contiguous, being a depopulated district of nine leagues extent, reaching to the village of Coronada, consisting of a plain without either trees or plants. At the end of this district, there are rocks of white quartz, veined with a pale red; also a great many oaks and wild olive trees, as well as that species of crowfoot, called *ranunculus ficaria* by Linnæus, whose roots are like barley corns, and from their resemblance to external hemorrhoides, fanciful people have imagined they had the virtue of curing them.

From Coronada, it is a journey of three hours to Villanueva de la Serena, from whence an extensive plain, entirely of sand, reaches to the village

lage of Don Benito, nevertheless fertile in corn, vines, pears, figs, &c. owing to the proximity of the water, as appears from the quantities of rushes springing up every where; for, though the surface is covered with a loose sand, for two or three feet, there is a bed of a more firm and compact sort underneath, which supports the water, without the assistance of clay, hard earth, or rock, to impede its filtration; so that this soil will often produce thirty for one; it being enough to plant a branch of a fig-tree, or a stake of an olive, for it soon to take root, and give fruit; yet, notwithstanding all these advantages, great part of the country lies waste, as far as Medellin, on the banks of the Guadiana, whose houses are small, and only of one story. In the centre of Medellin, they shewed me an humble mansion, though worthy of notice, as having been the native place of the illustrious Hernan Cortez, the great conqueror of the Mexican Empire. The lintel of the door, is of granite, similar to that of the Escorial, *a small cage indeed, for so considerable a bird!* said a bishop of Badajoz, on viewing this building.

From Villanueva I came, in four hours, to the village of San Pedro, crossing part of a sandy plain, but except what is cultivated, by the inhabitants of Don Benito, all the rest is neglected, and only serves for pasture, the water being at a
greater

greater distance. This district is called Torre Campos, and extends four square leagues, to the village of San Pedro, amidst hills, covered with oak, gum cistus, lavender, and white asparagus; from hence it is three hours journey to the city of Merida, descending, after the first league, into a well cultivated country, traversed by several brooks, that empty themselves into the Guadiana, whose beds are dry in the summer, as well as this great river itself, in many places; for, as it meanders so much in the plains, the sands soak up its water, which, by degrees, eats away the hills, converting the granite, sandstone, and rock, into sand; so that the coarse sand, the fine, and the pebble, are seen, decomposed, in the valley, in the same order they were ranged on the hills, from whence they have insensibly rolled down. Thus, for example, if, on the eminence, there was a quarter of a league of granite, the same proportion will be found in the valley, of pebble; if sandy rock, then coarse sand; and, if solid rock, then fine sand, and, at times, all blended together, from their having been so in their former position.

Merida, from its venerable remains, and antiquities, justly deserves the attention of the curious. What is now left of this antient city, is on a small hill, occupying about the circuit of a league, on the banks of the Guadiana, but its ruins extend much further,

further, and shew it to have been the principal colony of the Romans, in Spain.

Examining the remnants of stone, scattered amongst the ruins, I found a great variety of colours, mixtures, hardness, and qualities. To be the better acquainted with their nature, I attentively observed the adjacent hills, and plains, from whence they were most probably dug out; from these researches, I deduced four primitive sorts, which, by various mixtures, constitute the great variety observed here. The first is of a deep red, like bulls blood, and sometimes as brown as chocolate, with a smooth grain; this is the mother of Porphyry; the second is white, and without any grain; the third is of a blueish cast, tending to black, and the fourth inclining to green; all these primitive kinds, when considered singly, are of very little value, from the dullness of their tints, the white excepted; but, when blended together, have a pleasing effect. The white united with the porphyry, constitutes an anomalous stone, which cannot be classed with any of those described, either by the antients or moderns. Pieces of it are found on the surface of the ground, of twenty pound weight, and it is probable there are considerable beds of it underneath; for, naturally, the antients dug out the best, and where it was easiest to be got. The mother of porphyry,
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appropriated to itself in its primitive state, divers fragments of white quartz, from the size of a hazle nut to that of a chestnut, which occasions those various specks and appearances : when a piece of red stone is seen, chequered in this manner, it is the true porphyry, so esteemed by the antients ; in a word, this beautiful stone has no where its equal, and may justly be stiled the *Nonpareil of Merida*. Whenever the blue stone grows darkish, mixing with a little of the white, and some glimmer, it forms the grey porphyry, and when the green combines with fragments of white, it becomes the serpentine stone, and receives an admirable polish. These various combinations into one solid mass, evince, that at some remote period, they had a separate existence, in a state of solution, or soft paste : but if I am further asked, when this surprising union happened ? I shall be obliged to answer, that this is a circumstance I am entirely ignorant of.

There are still to be seen, in the city of Merida, the superb remains of two aqueducts, a theatre, a triumphal arch, a naumachia, a circus, two handsome bridges, one over the Guadiana, and the other over the Albarregas ; all which announce its former magnificence, exclusive of the statues, inscriptions, medals, and other antiquities, so frequently

quently dug out of its ruins †. It was made a Roman colony by the Emperor Augustus, after the Cantabrian war, became the capital of Lusitania, and stiled *Augusta Emerita*. But at present agriculture and cultivation are at the lowest ebb; nor do the banks of the river, in its neighbourhood, afford that verdure and pleasing shade, so greatly praised, even in the days of Prudentius, who said of this place,

Nunc locus Emerita est tumuli

Clara colonia Vettoniæ

Quam memorabilis amnis Anas

Præterit, et viridante rapax

Gurgite mænia pulcra alluit.

T LETTER

† The great indolence and negligence of our countrymen, with respect to antiquities, says Don Antonio Ponz, generally engages such travellers as come to Merida, to speak slightly of our want of taste and little curiosity. In the year 1752, when Don Juan Williamson visited that city, he made no difficulty to declare, that if the King had made excavations at Merida, as Don Carlos had done at Naples, he concluded it would turn out, in a manner, a second Herculaneum.—*Viage de Espana*. Tom. 8. Madrid, 1778. —This person here mentioned, was the Rev. Dr. Williamson, chaplain of the British factory at Lisbon, whom Ponz, by mistake, calls the British ambassador, at that court. Our envoy, at that time, was Mr. Casters, who died, in Lisbon, in 1756, where I happened to be, when that city still lay in ruins, in consequence of the fatal earthquake, of the first of November, 1755.

L E T T E R III.

Natural history of the locusts that ravaged the province of Estremadura, in the years 1754, 1755, 1756, and 1757, from the observations of Don Guillerme Bowles.

THE locusts, of which I am now going to speak, are continually seen in the southern parts of Spain, particularly in the pastures and remote uncultivated districts of Estremadura, but in general are not taken notice of, if not very numerous, as they commonly feed upon wild herbs, without preying upon gardens, and cultivated lands, or making their way into houses. The peasants look at them with indifference, while they are frisking about in the fields, neglecting any measures to destroy them, till the danger is imminent, and the favourable moment to remedy the evil is elapsed.

Their yearly number is not very considerable, as the males are far more numerous than the females. If an equal proportion was allowed, only for ten years, their numbers would be so great, as to destroy the whole vegetative system.

Beasts

Beasts and birds would starve for want of subsistence, and even mankind would become a prey to their ravenous appetites. In 1754, their increase was so great from the multitude of females, that all La Mancha and Portugal were covered with them, and totally ravaged. The horrors of famine were spread, even furthur, and assailed the fruitful provinces of Andalusia, Murcia, and Valencia.

The amours of these creatures are objects of surprise and astonishment, and their union is such, that it is difficult to separate them. When this separation is voluntary, after having lasted some hours, they are so exhausted, that the male retires immediately to the water for refreshment, where, losing the use of his limbs, he soon perishes, and becomes an easy prey to the fish; having given life to his offspring, at the expense of his own. The female, disembarassed, though not without violent struggles, spends the remainder of her days in some solitary place, busy in forming a retreat under ground, where she can secure her eggs, of which she generally lays about forty, screening them by her sagacity, from the intemperature of the air, as well as the more immediate danger of the plough, or the spade; one fatal blow of which, would destroy all the hopes of a rising generation.

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The manner of her building this cell is equally surprising. In the hinder part of her body, nature has provided her with a round, smooth instrument, eight lines in length, which, at its head, is as big as a writing quill, diminishing to a hard sharp point, hollow within, like the tooth of a viper, but only to be seen with the lens. At the root of this vehicle, there is a cavity, with a kind of bladder, containing a glutinous matter, of the same colour, but without the consistency, or tenacity of that of the silk-worm, as I found by an experiment, made for the purpose, by an infusion in vinegar, for several days, without any effect.

The orifice of the bladder corresponds exactly with the instrument which serves to eject the glutinous matter, it is hid under the skin of the belly, and its interior surface is united to the moveable parts of the belly, and can partake of its motions, forming the most admirable contexture, for every part of its operations, as she can dispose of this ingredient at pleasure, and eject the fluid, which has three very essential properties: First, being indissoluble in water, it prevents its young from being drowned; next, it resists the heat of the sun, otherwise the structure would give way and destroy its inhabitants; lastly, it is proof against the frost of winter, so as to preserve a necessary warmth within.

For

For the greater security, this retreat is always contrived in a solitary place ; for, though a million of locusts were to light upon a cultivated field, not one would deposite her eggs there, but wherever they meet a barren and lonesome situation, there they are sure to repair, and lay their eggs : this difference in the earth they discover by the smell. Those who are of another opinion, surely have not observed the delicacy of those organs in every species of insects, birds, and animals, which govern all their pursuits. I have even seen numbers of wasps come to a piece of meat, placed in an open field, and covered over with a glass, so that their motions, which seem the result of reflection, arise from the emanations and effluviæ in the air, which strike their delicate organs. I have seen legions of insects fly to places where they were bleaching wax ; the workmen observe, that the minute they touch it, they become faint, and if they do not, by a sudden exertion, free themselves from that vapour, which exhales about half an inch from the wax, they are suffocated, as we should be by the fumes of charcoal. Every one knows with what sagacity birds of prey fly to such distances, guided by the effluviæ of cadaverous bodies. Thus the locust of Estremadura, distinguishes the tilled land from the barren, and regulates its conduct in consequence, though ignorant of the motive of this preference, nor can it have
any

any idea of the spade, nor rejoice at the thoughts saving its progeny ; acting in consequence of that infinite perfection of its nature, given originally by the omnipotent creator. Like other insects, its motions are the consequences of primitive laws, founded on infinite wisdom, and not proceeding from secondary reflection ; there its behaviour preserves a constant sameness, and uniformity, originally perfect, and not standing in need of alteration, or improvement. The first locusts were as skilled as the present race, and their progeny will tread in their steps. Those who call it instinct, I suspect, do not understand what they mean, nor explain to us the true sense of that word.

Having spent many hours and days in observing the labours of the locust, I shall now proceed to describe them. The female begins, by stretching out her six legs, fixing her claws in the ground, and holding with her teeth to the grass ; then expands her wings, to press her chest close to the ground ; where, clinging firmly, and raising that part of the belly, where she has the instrument mentioned before, after forming a right angle with her body, she fixes it, with such strength, that it fastens to the hardest earth, and even in stone ; she has all the necessary apparatus to make a perforation, but this alone would not answer the

the purpose, a place being still wanted wherein she may deposit her eggs.

This hollow cavity is made in about two hours; she then begins to shift the earth underneath, and emits the glutinous substance. Having thus kneaded the earth into a substantial paste, and smoothed the floor with her trunk, she lays the first egg, then renews the operation and lays more, with admirable order, and after various repetitions, completes the whole in about four or five hours; next covering the superior aperture with a glutinous composition, the structure is perfect, with every advantage against the inclemency of the weather, or any hostile invasion.

The female is now overcome with fatigue, few having strength, like the male, to seek after refreshing waters; but, exhausted and spent, they expire close to to their progeny, exhibiting a melancholy sight to the labourer; who, from their appearance, foretells the mischiefs to follow, without being able to prevent them; forming an idea of the hidden enemies, who are to devour his harvest, from the multitude of carcases he finds dispersed in the fields.

I cannot omit one circumstance, observed by many others, as well as myself; and that is, when the females are busy in laying their eggs, or in turning the earth, a male would immediately fix
on

on her back, another male upon him, and another besides. Sometimes I have seen six males piled upon one another, over one female; the peasants pretended it was to give her more weight and strength to open the ground; but this could not be the reason, it seeming rather a moment of fury, as observed amongst animals; the more as I observed, that notwithstanding the great number of females in 1754, that of the males was still greater, even before they took wing, so as to be two or three hundred males to one female, and when they sallied out of Estremadura, to ravage La Mancha, I think I can take upon me to say, there were twenty males to a female; their sex is easily distinguished by their body and trunk, which induces me the more readily to give weight to my conjecture, from the great superiority of numbers in the males, who, luckily for mankind, are seemingly disappointed in their pursuits.

The egg which incloses the embryo, has the same cylindrical shape as the repository it is laid in, being a membraneous cylinder, one line long, very white and smooth. They are placed aside each other, rather obliquely, the head, as in others being nearest the part where it is to come out. The time of hatching varies according to climate, those that are in high and mountainous places, being generally later than those on the plains. I saw legions of them skipping about at

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Almeria in February, because the climate is so mild there that most kind of greens are nearly over at that time. In Sierra Nevada they only begin to appear in April, and in La Mancha they were hardly animated in May, when there were no greens yet in the market of San Clemente. So that they form a certain thermometer to judge of the warmth of the air. From these various situations proceed those immense swarms of locusts which appear successively in June, July, and August; but as they always lay their eggs in barren places which require a certain additional warmth, and temperature, to hatch them, it will account for their not appearing so frequently in cold climates, except such casual swarms of them as may have been wafted there by the winds.

When they first come out of the egg, they are black, of the size of a gnat, and gather in great heaps at the foot of shrubs, particularly the *spartum* or matweed, continually leaping upon each other, and occupying a space of three or four feet in circumference, two inches high. The first time I beheld this sight, it surprized me exceedingly, to observe this moving body, like a mourning scarf waving about, as at this period they only live upon dew, and are frisking about to catch it. For a few days they move at a very little distance, their limbs being weak, their wings very small, and their teeth not sufficiently strong to bite the grass. In
about

about twenty days, they begin to feed on the youngest shoots of plants, and as they grow up, they leave the society of each other, and range further off, consuming day and night every thing they fix upon, till their wings have acquired a full degree of strength; in the mean time, they seem to devour, not so much from a ravenous appetite, as from a rage of destroying every thing that comes in their way. It is not surprising, that they should be fond of the most juicy plants and fruits, such as melons, and all manner of garden fruits, and herbs, feeding also upon aromatic plants, such as lavender, thyme, rosemary, &c. which are so common in Spain, that they serve to heat ovens; but it is very singular, that they equally eat mustard seed, onions, and garlic; nay, feed upon hemlock, and the most rank and poisonous plants, such as the thorn apple* and deadly night shade.† They will even prey upon crowfoot, whose causticity burns the very hides of beasts; and such is their universal taste, that they do not prefer the innocent

* Thorn apple. *Datura ferox* of Linnæus.

† Deadly night-shade, or Dwale. *Atropa Belladonna*. Linn.—*Solanum Lethale* Park. 346. Gerard 340. The whole plant is poisonous, and children allured by the beautiful appearance of the berries, have too often experienced their fatal effects.—See a curious account of this plant in Dr. Withering's *Botanical Arrangement*, &c. vol. 1. pag. 126.

nocent mallow to the bitter furze, or rue to wormwood, consuming all alike, without predilection or favour, with this remarkable circumstance, that during the four years they committed such havock in Estremadura, the love apple, or *lycopersicon solanum* of Linnæus, was the only plant that escaped their rapacious tooth, and claimed a respect to its root, leaves, flowers and fruit. Naturalists may search for their motives, which I am at a loss to discover, the more, as I saw millions of them light on a field near Almaden, and devour the woollen and linen garments of the peasants, which were lying to dry on the ground. The curate of the village, a man of veracity, at whose house I was, assured me, that a tremendous body of them entered the church, and devoured the silk garments that adorned the images of saints, not sparing even the varnish on the altars. The better to discover the nature of such a phenomenon, I examined the stomach of the locust,* but only found one thin and soft membrane, with which and the liquor it contains, it destroys and dissolves all kinds of substances, equally with the most caustic and venomous plants, extracting from them, a sufficient and salutary nourishment.

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* Swammerdam tells us, the locust is of the ruminant kind, thinking to have discovered in them a triplicate stomach, like those animals; but he may have been deceived, and seen one thing for another, or examined locusts different from these of Spain.

Out of curiosity, to know the nature of so formidable a creature, I was urged to examine all its parts with the utmost exactness: Its head is of the size of a pea, though longer, its forehead pointing downwards, like a handsome Andalusian horse, its mouth large and open, its eyes black and rolling, added to a timid aspect not unlike a hare. With such a daftard countenance, who would imagine this creature to be the scourge of mankind! In its two jaws, it has four incisive teeth, whose sharp points traverse each other like scissars, their mechanism being such as to gripe or to cut. Thus armed, what can resist a legion of such enemies; after devouring the vegetable kingdom, were they, in proportion to their strength and numbers, to become carnivorous like wasps, they would be able to destroy whole flocks of sheep, even the dogs, and shepherds; just as we are told of ants in America, that will overcome the fiercest serpents.

The locust spends the months of April, May, and June, in the place of its birth; at the end of June its wings have a fine rose colour, and its body is strong. Being then in their prime, they assemble for the last time, and burn with a desire to propagate their species; this is observed by their motions, which are unequal in the two sexes. The male is restless and solicitous, the female is coy, and eager after food, flying the approaches of the male, so that the morning is spent in the courtship of
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of the one, and the retreat of the other. About ten o'clock, when the warmth of the sun has cleared their wings from the dampness of the night, the females seem uneasy at the forwardness of the males, who continuing their pursuit, they rise together five hundred feet high, forming a black cloud that darkens the rays of the sun. The clear atmosphere of Spain becomes gloomy, and the finest summer day of Estremadura more dismal than the winter of Holland. The rustling of so many millions of wings, in the air, seems like the trees of a forest, agitated by the wind. The first direction of this formidable column is always against the wind, which if not too strong, it will extend about a couple of leagues; they then make a halt, when the most dreadful havoc begins; their sense of smell being so delicate, they can find at that distance, a corn-field, or a garden, and after demolishing it, rise again, in pursuit of another: this may be said to be done in an instant. Each seems to have, as it were, four arms and two feet; the males climb up the plants, as sailors do the shrouds of a ship; they nip off the tenderest buds, which fall to the females below. At last, after repeated devastations, they light upon some barren ground, and the females prepare for laying their eggs.

What a dismal sight for a poor farmer, after having being visited by such cruel guests! A sensible

fible man, amongst them, on viewing his corn-fields, where nothing was now left but chaff, thus expressed himself; "If these creatures were not
 "so coy, and would suffer the embraces of their
 "mates, in the country where they were hatched,
 "we should not be loaded with such dreadful mis-
 "fortunes; but, like us, they fear death, and
 "strive to prolong life; for which reason, they
 "shun the advances of the males, knowing, that
 "afterward nothing is left, but to deposit their
 "eggs and expire!"

We learn, by tradition, as well as from history, that these locusts have been a plague to the meridional provinces of Spain time immemorial. I remember to have read in an old Spanish novel, the following question, "which was the animal that resembled most all other animals?" the answer was, "the locust; because he has the horns of a
 "stag, the eyes of a cow, the forehead of a horse,
 "the legs of a crane, the neck of a snake, and
 "the wings of a dove."

However puerile this may appear, it proves the great length of time they have been known as well as dreaded. Many old people assured me, when so much mischief was done in 1754, it was the third time in their remembrance, and that they always are found in the pasture grounds of Estremadura, from whence they spread into the other provinces

vinces of Spain. They are certainly indigenous, being of a different shape from those of the north or the Levant, as is evident in comparing them with such, in the cabinets of natural history. The locust of Spain is the only one that has rose-coloured wings: besides, it is impossible they can come from any other part; from the north it is clear they do not, by the observation of so many ages; from the south they cannot, without crossing the sea, which is hardly possible, by the shortness of their flight, and, like birds of passage, they would be known. I once saw a cloud of them pass over Malaga, and move towards the sea, and go over it, for about a quarter of a league, to the great joy of the inhabitants, who concluded they soon would be drowned; but to their disappointment, they suddenly veered about towards the coast, and pitched upon an uncultivated space surrounded with vineyards, which they soon after quitted. When once they appear, let the number demolished be ever so great, the proportion remaining is still too considerable; therefore, the only way to put an end to such a calamity, is to attack them before hand, and destroy their eggs, by which means they might be totally extirpated. *

LETTER

* In the life of Dr. Thomas Moffet, prefixed to a work of his, intitled, "Health's improvement, London, printed

L E T T E R IV.

Of the barren and wretched district of Batuecas, in Estremadura.

THE territory of Batuecas, situated on the confines of Castile and Estremadura, near Portugal, has given ample scope to the fanciful conceits of different writers, relating to its imaginary discovery, and whether or not as supposed, it was an unknown land, inhabited by Pagans, blinded by ignorance, without the least knowledge of the Christian religion. This district we are now going to explore, is fourteen leagues to the south west of Salamanca, about eight leagues eastward of Ciudad Rodrigo, and twelve to the north west of Plasencia, forming a plain, or more properly, a most dismal and horrid gully at the foot of that famous mountain, where
stands

ed for T. Osborne, 1746;" mention is made of his Theatre of insects published abroad in 1598, where speaking of locusts, he particularly relates, how much the Spaniards were then afflicted with swarms of them, that flew over from Africa, the news of which was received when he was writing that account. If to this occasional calamity, we add the the frequent droughts to which their meridional provinces are so subject, and which cause such distress amongst the poor, it will be a great drawback from their boasted fertility.

stands the noted convent called *La Pena de Francia*. The situation of this place inspires every idea of gloom and melancholy, closed in by jagged mountains, where hardly a tree is to be seen, or the least appearance of vegetation : on the contrary, numberless precipices, occasionally choaked up by broken masses of stone, detached insensibly from the rocks, form the most frightful scene the mind can conceive. Such is the true state of Batuecas, horrid by nature ; rendered still more so, by ignorance and folly. The itinerary from Plasencia to the convent of Batuecas, is as follows : Plasencia to Aigal four leagues ; Mohedas one ; Casar de Palomero one ; Cambroncino two ; Vegas de Coria two ; Las Mestas one ; and to the convent of Batuecas half a league.

Between Plasencia and Aigal, the hamlets of Oliva and Gijo de Granadilla, appear on the right, and Santibanez el Baxo, on the left, with woods of oak and cork trees. You cross the river Ambroz, or de Caparra, and pass by the Puerto del Gamo, before you reach Casar de Palomero. Then enter the melancholy district of the Jurdes, being a division of what is generally called Batuecas ; but in any part of this wretched country, if you ask whereabout is the Jurdes, some will tell you, a little further on, and when you proceed, another informs you, it is at a small distance behind ;

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hind ; nobody being willing to acknowledge himself an inhabitant of the unhappy country of the Jurdes.

The valley of Batuecas, was idly considered as an unknown part of the world, by those who gave into the fabulous accounts invented in the reign of Philip the II^d. though an enlightened age in the annals of Spain. As a further proof of the ideas of the times, we have only to look back on the report made by Galarza, bishop of Coria, to whose diocese this country belongs, when he gave leave to the Carmelite friars to build a church there, which document is to be found in the records of that house. “ I give thanks to the Almighty (says “ this prelate) that in so desolated and wretched a “ country, where it appears from certificates, “ which I have among the records of my bishopric, “ that about forty years ago its inhabitants were “ Gentiles, deceived by the devil with visible apparitions, his majesty has now ordered a sanctuary “ to be built, to which I give my concurrence with “ great satisfaction, and shall as far as lies in my “ power, contribute towards so pious a foundation.”

This record being positive, and the good bishop having given ear to the many exaggerations and false reports, obtruded on the public, might have confirmed these fables in the minds of the people, which

which insensibly spread themselves over Spain, and extended even amongst foreign nations. They were the more easily propagated at Batuecas, amongst ignorant people, in want of pastors and Christian instruction; their neighbours then took the alarm, and would not venture to move forward with their flocks. In more remote villages these reports lost nothing by the way, so that in many places, the poor harmless inhabitants of Batuecas were looked upon as savages, destitute of all information, beyond their bleak hills, where they lived in the grossest ignorance, and were supposed to worship the devil.

It was given out as an incontrovertible fact, that a certain lady, belonging to the illustrious house of Alba, seduced by her lover, had fled to these parts, and first made the discovery, meeting with a barbarous people, whose manners, and even language, were strange to them, except a few Gothic expressions. Such were the tales believed at Salamanca, the seat of a famous university; at Madrid, the residence of the court, and in many other places of note. It served as a foundation for novels, as well as dramatic performances, repeatedly exhibited on the stage, and propagated all over the kingdom.

Soon after the friars had settled themselves in this place, and spoken to the graver sort of people, concerning these matters, many of them laughed

at their simplicity, while others expressed their indignation against the inhabitants of Alberca, whom they reproached with being the authors, through motives of jealousy, of such a ridiculous and invidious report.

The town of Alberca is the principal place in the territory of Batuecas, and not above a league distant from this valley : its inhabitants could not be supposed ignorant of the fallacy of the report, as their flocks were constantly grazing there ; yet, so great was the prejudice and ignorance of the people, that Thomas Goncales Manuel, a clergyman of the town of Alberca, thought it necessary to justify his countrymen, and in 1693, published an essay in their defence, under the title of “ A true narrative and apologetical declaration of the antiquity of Batuecas ;” in which he seriously refutes the illusion by authentic documents and records, belonging to the town of Alberca, and its neighbourhood.

The late father Feijoo said every thing necessary on this subject, in his critical works,* intended to explode the many vulgar errors that prevail amongst his countrymen, adding his astonishment that they should have been corroborated by national writers, such as Nieremberg † and Alonso Sanchez ; ‡ by which

* *Theatro critico*, tom. 4. Disc. x.

† *Nieremberg cuerosa philosophia*, lib. 1. cap. 35.

‡ *De rebus Hispaniæ*, lib. 7. cap. 5.

which means they even got credit abroad, and geographical writers of no small reputation ventured to copy them; particularly Thomas Corneille, and the author of the Great Atlas, as well as Moreri in his Dictionary.

The whole of this district may properly be reduced to an intersected valley of about a league in length, sometimes so confined as just to leave room for the passage of the river that gives name to the valley: This then was that unknown country so surprizingly dreaded, where it is certain no others dwelled but a few wretched shepherds, and some miserable peasants, in forlorn huts, surrounded by precipices, divested of all intercourse with their neighbours, in a wild romantic situation, which the most fanciful pencil would find difficult to delineate, or the language of Shakespeare to describe.

The other valley called, "of the Jurdes," which may be about four leagues long, and three in breadth, yields not to the former in wretchedness and misery. During the whole journey from Alberca to Batuecas, nothing is to be seen but a repetition of jagged and illshapen rocks, with their rugged peaks, like so many turrets and battlements, towering one over the other, as far as the eye can extend, forming dreadful gullies where the river forces its way, whose waters are clear, abounding with trout, and having grains of gold in

in its sands, which the peasants know well how to look after, and sell at Plasencia, Ciudad Rodrigo, and Salamanca, * which is a great resource to them in this sorrowful vale; where during winter, the sun's rays can hardly penetrate for above four hours in the day. To increase still further its horror, the hills are perforated with dismal caves, one above the other, and some so extensive, that three or four hundred sheep may easily take shelter there; to complete this picture of distress, let it suffice to add, that this country is the resort of numerous birds of prey, and affords shelter to bears, wolves, wild cats, and weazles, which destroy all the hares and rabbits, with the addition of snakes, serpents, and many obnoxious reptiles, particularly one sort of serpent, which darts at its prey with great violence, and perhaps may be of that species called *Jacula*, or *Jaculum serpens*, described in the acts of the Leopoldine academy, which mentions one of these to have darted from a ditch, to a considerable distance, and fixed itself upon the arm of a peasant. But why need I enlarge any further on so dreary a spot, or describe so barren a country, where even grass is not to be seen! here and there a solitary cistus, and nothing but furze, the only resource of goats and some bees, who are of service merely on account of their wax, as their honey

* The same happens in the river Sil, in Galicia, where the poor people are employed in this manner, after floods.

honey is neither valuable for its colour nor flavour, having all the bitter taste of their food.

In this wretched country the Carmelite Friars pitched upon a little plain on the banks of the river, and built their convent in 1599, but their house has nothing worthy of description; and though the very sight of a distressed traveller at their gates, should be sufficient to engage the benevolent minds of these holy fathers, they are seldom in a hurry to open their doors, and none are admitted or intitled to hospitality, but such as are provided with letters of recommendation and positive orders from the provincial or general of their order.

L E T T E R V.

The convent of Juste, in the Vera of Plasencia, famous for the retreat of the emperor Charles the Vth.

WERE we to believe the exaggerated accounts which Spanish writers in general give of their country, we should be inclined to imagine the whole kingdom was a paradise flowing with milk and honey, where nature had lavished her most luxuriant productions; but whenever the

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traveller happens to pass through the interior parts of the kingdom, and to form his judgment from personal inspection, he will then be convinced that many of these assertions require a considerable lowering before they are reduced to the simplicity of fact and of truth, for though it must be allowed that the southern parts are fertile, that the plains of Valencia are delightful, and that the Biscayners have been indefatigable in cultivating their rugged mountains, yet when we take a general survey of the kingdom in the review of a journey through Spain, it will be found that barren hills and naked rocks and mountains, form a considerable part of the prospect, diversified only here and there with a few scattered spots of imperfect cultivation: Many districts still remaining uncultivated, and the rivers overflowing their banks without any impediment, in the same manner as they did in the earliest ages of the world; as if they were to receive every blessing from Providence without the least trouble or fatigue.* Amongst innumerable instances which might

* Don Antonio Ponz reproaches his countrymen very feelingly for their neglect on this subject in the following lines; "Los rios regularmente corren entre nos otros por donde Dios los encamino a principio del mundo, como si no hubiera dexado con grandissima providencianada que estudiar en el cultivo de las tierras, sino que todo hubiera de ser facil.

might be alleged in support of this assertion, I shall confine myself to one given by the Spaniards themselves, of the so much celebrated valley of Plasencia, in Estremadura, represented by many as the most delightful place in the world, selected by the great Emperor Charles to finish his days, and supposed to be seated in an enchanting vale, covered with all manner of fruit trees in the highest perfection, where the very air was embalmed with the most delicious odours; but alas! this is far from being the case, as the judicious Spanish writer, † who lately visited that province, informs us, who complains loudly of its most miserable state, and from his authority, therefore, I shall venture to pronounce on its present most wretched and neglected condition.

After quitting the city of Plasencia, and crossing the river Xerte, you pass over the hill of Calcones, opposite the city, then descend into the territory of the Vega, leaving on your left the villages of Garguera, Barrado, and Arroyo Molinos; you next

go

facil. No es assi, ni tal quiso, sobre cuyo punto dijo bien uno de los mejores poetas."

Pater ipse colendi

. Haud facilem esse viam voluit primusque per artem

Movit agros, curisacuens mortalia corda. Virg. Georg. I.
Viage de Espana, tomo 3. Madrid 1777.

† Don Antonio Ponz. — See Viage de Espana, tom. 7.
Madrid 1778.

go through the village of Pasaron, five leagues from Plasencia, and come to a pleasant situation called La Magdalena, where there is a good farm house, which formerly belonged to the Jesuits: you are now at a league's distance from Juste, and to go there you traverse a woody country with a few chefnut trees, and pass several brooks, where they catch excellent trout. The convent of Juste is situated nearly in the centre of the Vera, on the brow of a steep hill, which protects it from the North wind, and with other mountains forms that chain which is called the Puerto de Tornavacas, joining with the hills of Arenas, Puerto del Pico, and others. Neither the convent nor church have any thing remarkable, and would have passed on to future ages in oblivion, had it not been for the distinction shewn them by the great Emperor who ended his life in this solitary place. Over the great altar in the church, they have a copy of that famous picture called the glory of Titian, which stood formerly here, and was removed to the Escorial by express command of the Emperor, who ordered that the original should be fixed in the same church with his remains. The following inscription is seen on the wall, in a corner of the garden, underneath the arms of the Emperor.

”EN

“EN ESTA SANTA CASA DE S. HIERO-
 “NIMO DE JUSTE SE RETIRO A ACABAR
 “SU VIDA, EL QUE TODA LA GASTO EN
 “DEFENSA DE LA FE Y CONSERVACION
 “DE LA JUSTICIA, CARLOS V. EMPERA-
 “DOR REY DE LAS ESPANAS CHRISTI-
 “ANISIMO, INVICTISIMO. MURIO A 21
 “DE SETIEMBRE DE 1558.”

In this holy house of St. Jerom of Juste, ended his days, he, who spent the whole of them in defence of the faith, and in support of justice, Charles V. Emperor, King of Spain. Most christian, invincible. He died on the 21st Sept. 1558.

These are the only traces left here of that great Emperor, who once filled the world with the glory of his deeds. The ruined decorations of the garden and ponds seem to intimate their pristine state in happier days, and the several plantations in the Vera, watered by numberless brooks, might once have exhibited a more pleasing appearance.

A distinction must be made between the *Vera of Plasencia* and the *Valle de Plasencia*. The valley extends from the city to the Puerto de Tornavacas, upon a straight line from East to North, the length of nine leagues, and so level, that the whole extent lies open to your view, as far as the *Puerto*, closed by high mountains, dividing on the right hand the *Vera* from the *Valle*, and on the left the hills between the valley and the road to Banos, and finally

finally those of Tornavacas, whose high tops are always covered with snow.

The villages belonging to the valley are Asperilla, Casas del Castanar, El Torno, Valde Astilla, Cabrero el Rebollar, Navaconcejo, Cabezuela, Badillo, and Xerte, which gives name to the river, as Tornavacas does to the *Puerto*, but at present every branch of cultivation is at the lowest state, without even the appearance of an orange or a lemon tree, if we except two or three blighted ones at the convent of Santa Cruz de Tabilla, where the country is a desert : and what is still worse, the mountains and passes are filled with assassins and robbers, to the great terror of the inhabitants and travellers. The *Vera* is no better, and affords the most melancholy aspect imaginable ; amongst the various experiments to destroy the worms that ruin the chesnut trees, fire was the last expedient, in so much, that the trees, scorched and half burned, now resemble the oaks struck by the thunder of Jove, instead of the golden age of the poets, and their whole agriculture is reduced to the sowing a few peas, with some miserable scraps of a vineyard. The villages of the *Vera* are Piornal, Barrado, Garguera, Arroyomolinos, Pafaron, Gargantalolla, Xarandilla, Gijo de Arandilla, Xarais, Robledillo, Aldeanueva de la Vera, Viandar, Villanueva, El Osar, and Cuacos : This last being near to Juste,
and

and distinguished by the savage disposition and ferocity of its inhabitants; to such a degree as to overcome the patience of that great personage who lived in their neighbourhood, by offering him every affront their low station would permit, taking his cows if they happened to stray into their district, and stealing the trout reserved for his use; and to crown all, flinging stones at Don John of Austria, the Emperor's son, whenever he ventured to taste of their cherries.

L E T T E R VI.

Further observations made in the course of another tour by Don Guillermo Bowles from Almaden to the silver mine of Guadalcanal.

I SET out from Almaden for the village of Alcocer; in the plain there is a lead mine which has never been worked; after an hour's journey we came to the mountain of Lares, where there are ruins of a Moorish castle; here I saw for the first time the true Spanish emery, which before I only knew by specimens in the cabinets of Paris; *

* Emery is a sort of metallic stone, found in most, or all mines of metals, but chiefly in those of iron, copper, or gold, of which three kinds are usually distinguished; the Spanish

the hill where it is found, is of sandstone, mixed with quartz: this mineral is blackish, resembles the Spanish red, and common emery. The first sort is found in the gold mines of Peru, and other provinces of Spanish America. It is judged a kind of *Marcasite* of that rich metal, being streaked with little veins and specks of gold, for which reason the king of Spain prohibits the exportation of it, whereby it is rendered exceedingly scarce, to the great regret of the searchers after the philosophers stone, who build great hopes in the transmutation of this precious metal. The red emery is found chiefly in the copper mines of Sweden and Denmark. The common emery is taken out of iron mines, and is almost the only sort used in England, the consumption of which is very considerable amongst the armourers, cutlers, locksmiths, glaziers, lapidaries, masons, and other mechanics, some of whom use it to polish and burnish iron and steel works; other mechanics, some of whom use it to polish and burnish iron and steel works; others to cut and scallop glass, marble, and precious stones.

The common emery is of a brownish colour, bordering a little on red, exceedingly hard, and of course difficult to pulverize. The English are the only people that have got the art of making it into powder, which is done by mills contrived for the purpose, and in that state they send it to their neighbours. Emery fused with lead and iron hardens them. It increases and heightens the weight and colour of gold. It is usual to mix a little of it with the gold from Madagascar, which is naturally pale and soft. It is brought in English ships from the Levant, particularly from the island of Naxia, where it costs but a crown the twenty-eight quintals; the quintal weighing 140lb. which is therefore what they usually ballast their ships with. Rolt's Dict. of Commerce.

the polish given by the bloodstone, and is so hard that it emits fire when struck with steel. The Moors worked this mine, but more perhaps, for the sake of the gold which it probably contains, than for any other motive; and as their method is not to be found in any Arabic book that I know of, either printed or manuscript, I should think the following trial might be made. Let the ore be first softened by fire and water, then exposed to the air for four or five months or more, that the phlogiston might separate, leaving the matter in a proper state to extract the metal by fusion. I found two sorts of emery in Spain, one in a ferruginous stone, and the other in sand loaded with iron. §

Between

§ Notwithstanding what is said here relating to emery, Mr. Bowles, in page 364 of his work, further informs us, that he found five sorts of emery in Spain. First, That of Reinosa, composed of large grains. Secondly, Of very small fine grains, found at the foot of Guadarrama mountains, and used at St. Ildefonso, for polishing of crystals. Thirdly, The one of Alcocer, mentioned above, worked by the Moors, which has no grain, but on breaking the stone is smooth like an hematite, and contains a little gold. Fourthly, A species of emery, as it were marbled in quartz, found about Molina de Aragon, and in Estremadura, in a district granted by the king, to Don Pedro Rodriguez Campomanes, containing a little gold, but not worth the expense of searching for. Fifthly, Another sort dispersed in many parts

Between Alcocer and Orellana, there is an iron mine in sandstone, with the finest red ocre in the world. A steep mountain must be crossed to arrive at Nabalvillar, where there are blood stones, and a species of black earth, which shines when rubbed in the hand, but is only a *blend* or dead mineral of no use. From hence you go to Logroñan, at the foot of a chain of hills which run from east to west, called *La Sierra de Guadalupe*. In coming out of the village, a vein of phosphoric stone crosses the road obliquely from north to south. It is a whitish stone without any flavour. When pounded and thrown on the fire, it burns and emits a blue flame, without any smell.* In the mountain to the north of this village, there is a silver mine in a whitish stone, with white mica, and in the mountain of *Guadalupe* to the south, there is a copper mine in a flaty stone, jaspered with blue and green. An extensive uncultivated plain

parts of Spain, particularly in the Lordship of Molina, between Tortuera and Melmarcos, in loose, black, heavy stones, seeming to be the residue of some rock or mine, and having when pulverized, hard pungent and mordicant particles.

* Mr. Bowles says it is the phlogiston of the coal that causes this flame, but this explanation cannot be admitted; for it is well known that the phosphoric stones emit a blue light, when heated, without being exposed to any substance, supposed to contain phlogiston.

plain lies half way between Nabalvillar and Logrofan, covered with the kermes oak; but before you reach Logrofan, the sandstone disappears, and the houses of that village are built with granite from the hills of *Guadalupe*.

After having gone out of our road to examine the phosphoric stone, we returned again to Orellana, at which place we crossed the Guadiana, where its bed is very shallow, in order to see a lead mine two leagues further to the southward, on the road to Zalamea.* This mine is found on a small eminence called *Vadija*, or *Valle de las minas*; the vein runs from north to south, cuts the flaty stone, and is seen in a bed of quartz, which is
X discovered

* The town of Zalamea is six leagues from Aracena, in the very heart of the Sierra Morena. The country people have a tradition, that it was built by those persons sent there by Solomon in quest of the silver mines, who named the place after him, in proof of which they assert that a very antient castle just by, is still called Castle of Solomon. One of the villages in the jurisdiction of Zalamea is named *Obiud*, and the river near it *Odiel*, being Hebrew names, which I was informed of, says a celebrated Spanish writer, by a clergyman, as well as by antient people of the place; but this is not so easy to prove, or for me to give assent to, merely on their traditional relations. If it were true, that the *Tharfis* of Scripture was *Tartessus*, then indeed it might be presumed that the treasures were got from hence; for which I refer them to Goropius Becanus Lib. 7. *Hispanicorum*. See *Antiguedades de Sevilla* por Rodrigo Caro. Sevilla 1634.

discovered from a brook about two hundred paces from the first shaft, where the vein does not follow as I said above, but strikes off from east to west. The miners lost it by crossing the brook from north to south, when they should have followed it according to the direction of the soft slate as I did, and found it again.

Continuing two leagues further to the southward from this mine towards Zalamea, there is a silver mine without any lead in the spar; this vein is found in a rock of granite, cut contrary to its natural direction, and consists of spar, quartz, white and yellow pyrites, with a shining, black, small pyritous matter. The country, for many leagues round, is replete with immense pieces of granite, lying above ground, like the rocks of Fontainebleau; the land produces a great deal of corn, and is well furnished with oak.

These two mines being so near to each other, might be reciprocally advantageous, as the lead would be useful for refining the pyritous silver. In the one which is abandoned, the remains of a crucible and reverberatory furnace are still to be observed; they quitted it on being overwhelmed with water, but it might easily be cleared again, it being situated on an eminence, called *Chantre*, as the lead mine is on another, 300 feet higher than

than a brook, where, in summer, there is seldom any water.

From Zalamea we passed an extensive plain of eleven leagues, called *Vinolas de Zalamea*, and came to the village of Berlanga; where entering upon the *Sierra Morena*, we arrived, in four hours, at the famous town of Guadalcanal, observing great quantities of sumach in these parts, which is cut in the month of August; after which the leaves and flowers are pounded and sold to the curriers of Seville, who use it for dressing of leather.†

L E T T E R VII.

Description of the famous silver mine at Guadalcanal in Estremadura.

THE town of Guadalcanal is the last to the southward in the province of Estremadura, only separated from Andalusia by the small stream of Benalija. The famous and boasted silver mine of

X 2

Gua-

† The best Sumach is that which is greenish and new: Oporto in Portugal, being the place which furnishes the most, and generally speaking, the best. Rolt's Dict. of commerce.

Guadalcanal, § so celebrated by historians, and of which such various and uncertain accounts have been published, is situated about half a league distant from the town of that name, belonging to the knights of Santiago, and surrounded with high mountains. The first discovery of this mine, according

§ This is not Mr. Bowles's account of the Guadalcanal mine, but I have reason to think it a more perfect one, giving the real state and present condition of the mine from whence a judgment may be formed of Mr. Bowles's conjectures. He says there are about 8000 families at Guadalcanal; but they exceed a thousand, besides a convent of friars, three convents of nuns, and sixty ecclesiasticks, who do not enter into the contribution roll, though they have houses and families. He mentions the mine being a league distant from the town, whereas it is only a mile and-a-half. He tells us, Guadalcanal is a very dry spot, though the inhabitants allege that there is not a more moist and damp town in all Estremadura. In the square there is one of the richest springs of excellent water that can be met with any where, and all the houses have wells at a small depth. There are four fountains in different parts of the town, which have no connection with the principal spring in the square, besides several small spouts of water continually running in the streets, that make the houses so damp, that the lower apartments cannot be inhabited without inconvenience before July. Though he says the galleries of the mine were in perfect good order, he could not have a just notion of them, proceeding no further than 50 feet, for the information of Don Joseph de Carvajal, minister of state at that time.

cording to the best information, was made by a farmer of the town of Guadalcanal, whose name was Delgado. This man accidentally met with the ore, as he was ploughing his fields: being struck with its brightness, he carried it home, after carefully covering the place, and then set out for Seville, where he was informed it was a valuable ore. This is said to have happened in the year 1509, soon after the discovery of America by Columbus, and is looked upon as the most ancient record of this mine. The surprising accounts which used daily to arrive from America, relating to those new discovered mines, added to the little information Delgado was able to procure at home, inspired him with the same ardour as many of his countrymen, and engaged him to repair thither for further instruction, where, after obtaining all the lights in his power from the American miners, he returned again to Spain, made a discovery to the court of the mine of Guadalcanal, soliciting a grant, and proposing to work it at his own expense. Though it might be supposed, this must have answered his purpose, nothing appears from history, either with respect to himself, or his heirs; and what is still more singular, the mine seemed to be without any proprietor in the reign of Philip the second, which gave rise to the laws promulgated in his reign, under the title of *Ordenanzas de Minas*, and are to be found in the *Recopilacion*, or code,

code, published by that prince, which with respect to mines, are the only laws extant in the kingdom.

The Fuggers of Augsburg, obtained a grant of them from Philip the second, after they had been worked for some time on the king's account. Several Spanish writers assert, that immense riches were taken out of this mine, particularly Carranza, in his treatise on Spanish coins, * affirms, that one week with another, they extracted the value of sixty thousand ducats. The history of the house of Heralti says, that this mine had produced eight millions of *pesetas*, † which were employed in building the Escorial. Be this as it may, the chief shaft in the mine acquired the name of *Pozo Rico*, "The rich shaft", and continued in the hands of the Fuggers and their heirs, until 1635, when they totally abandoned it, after having gone a great depth, and formed ten galleries, though it is surmised they continued it for political reasons, to cover other projects, as they solicited considerable loans to pursue their works, and when they relinquished it, reports were spread, that it contained several rich veins of silver ore, which none could contradict, for in less than a month the mine

* Licenciado Alonso Carranza *Ajustamiento de Monedas y reduccion de metales*. Madrid, 1629.

† Valuing the *peseta* at 10*d.* sterling, the eight millions above-mentioned will amount to £.333,333, 6*s.* 8*d.* sterling.

mine filled with water within thirty feet of the surface. This opinion however has been handed down from one to another to the present time.

In 1690, Raphael Gomez, a Jew, obtained a grant of this mine from Charles the second, and formed a company with some Portugeze merchants of his tribe. They attempted to drain Pozo Rico, but for want of a sufficient capital, engines, and intelligent workmen, they could not drain further than the third gallery, and failing in their future attempts, were charged with duplicity and fraud; Gomez was arrested and carried prisoner to Seville, where he underwent a long and severe confinement, though he printed his case and defence, but died before the business came to an issue.

The distracted state of king Charles's finances, suggested to his ministers the idea of continuing the works of these mines; on this account, and to give this operation a more plausible appearance, the guilt of Gomez was to be made more conspicuous; Don Alonso Carillo Rueda, of the council of finances, was named superintendant of the mines, and ordered to repair thither directly, and carry on the works on his majesty's account; following the directions of a wandering friar lately returned from America, appointed chief engineer, on a supposition of his knowledge

in mines. Carillo arrived at Guadalcanal in 1695, and Gomez was arrested as mentioned before; he then proceeded in his commission with all the deliberation and formality of the law, issuing out orders, and multiplying writings at every step; they began to drain Pozo Rico, but never went further than the third gallery; sickness, want of money, and other impediments, baffled all their attempts; this famous mine was once more abandoned, and Carillo and his retinue returned to Madrid.

The death of Charles the second, the last Austrian monarch of Spain, and the succession war which followed, prevented all further pursuits of this kind, till 1725, when a new company was formed at Madrid, with fresh expectations of success. The draining of Pozo Rico was once more undertaken, but all their labours were fruitless. In this embarrassed situation a new ray of light seemed to pierce the recesses of these hidden mines, and revive the drooping spirits of the present adventurers, raising them from a desponding anxiety, to the most sanguine expectation. The personage who was to work this surprising alteration, was no less a character than an English lady of quality, of very high rank. In 1728, lady Mary Herbert, daughter of the marquis of Powis, arrived at Madrid from Paris, where she had been concerned in the Mississippi schemes, and by her acquaintance with the famous

famous Mr. Law, had improved her talents and natural genius for enterprize, which engaged her to set out for Madrid, and make proposals to the Spanish company for draining the silver mine of Guadalcanal, in which expedition she was attended by Mr. Joseph Gage, grandson of Sir Thomas Gage, Bart. of Hengrave, in Suffolk.

Those who are acquainted with the genius of the Spaniards, and the great deference they pay to the fair sex, will easily conceive what impression such an offer must have made, when, exclusive of the profit it offered, it came from a lady of the most illustrious birth, with the additional advantages of person and talents. Lady Mary proposed to the company to drain the mines, on condition they would allow her two hundred thousand dollars,* payable at different times as she proceeded, and half the profit of the mine, which was readily accepted, and a formal agreement concluded; the Spanish company having raised a considerable subscription by public authority. Lady Mary set out for the mines, and procured engines from England, as well as miners, engaging her own fortune in the undertaking as well as that of Mr. Gage, and a large sum from the noble marquis her father: Her agents undertook the draining of Pozo Rico, and had

* £33,336 6s. 8d. sterling, valuing the current dollar at 40d. English.

had tolerable success, receiving punctual payment from the company ; but towards the end, disputes began to arise, the Spaniards insisted that Lady Mary's agents were obliged to clear away the mud, and remove every obstruction from rubbish in the galleries : Her ladyship endeavoured to prove her contract only related to the water : the payments were stopped, and a suit at law commenced. Lady Mary went on at her own expense, and thoroughly cleared the mine to the tenth gallery. Here there was supposed to be a rich vein of mineral, and as no Spaniard had gone to that depth, the opinion was easily circulated : it got further credit, when lady Mary presented a petition to the judge conservator of the mine, requesting in a judicial form, that a quantity of this ore should be brought up and smelted in presence of the court ; its value properly ascertained, and attested. The judge issued his decree accordingly, but as all the agents were foreigners, and united in their views, an imposition is said to have been artfully practised, in presence of the judge and officers of the court, as well on the Spanish agents, as on the numerous witnesses present on the occasion. Out of 40lb. of ore supposed to be from the tenth gallery, the produce was made evidently to be ten pounds, thirteen ounces of fine silver ; which was handed about in an ostentatious manner, and afterwards shewn to the king, who then resided

resided at Seville, by the marquis de la Paz, prime minister of Spain, which fixed the reputation and riches of this mine beyond all manner of doubt. The law suit had continued against lady Mary for two years, and as the preserving the galleries already drained, was very costly, they soon filled again with water; but her ladyship, by her high rank and polite address, having been able to acquire a powerful interest at court, king Philip, out of his natural benevolence and equity, after being informed of all these transactions, was pleased to declare, That lady Mary Herbert had fulfilled her engagements: giving a decree in her favour, against the Spanish company, excluding them from all their right in the mine of Guadalcanal, and granting the same to lady Mary Herbert, for the term of thirty years, to her and her heirs, &c. under the same conditions, and with the same provisos of continuing the works at her own expense, within the term of two years, of which her ladyship afterwards obtained a prolongation, but never appeared any further in this business, though her agents spared no pains to procure new adventurers, and prosecute their schemes. In 1736, Mr. Gage obtained, in his own name, from the court of Spain, a grant of the mine of Cazalla, which is called *Mina de Puerto Blanco*, where they continued working till 1746; and though it produced some very rich mineral, with large quantities of silver,

ver, it never answered the expense, added to the plunder of agents and servants, particularly after the death of Mr. Richard Westley, an Englishman, on whose skill they chiefly depended. Moreover the buildings of both mines were robbed of the timber and materials, by the inhabitants of the adjacent villages, who, living in a remote part of the country, did every thing with impunity, as no effectual methods were taken to prevent it; all these misfortunes contributing to ruin the mine as much as the water; while the event of the *ten pounds thirteen ounces* of fine silver, having been printed by authority and circulated abroad, kept up its reputation in those remote kingdoms, where they were at too great a distance to know the real state of the case, and only saw the favourable side of the question. In the year 1767, Mr. Thomas Sutton Count de Clonard, who is settled at Paris, made his proposals to the court of Spain. The Spanish council of commerce and mines being well informed that lady Mary Herbert, on account of her great age and other reasons, was not in a situation of fulfilling her contracts, was willing to grant the mines on the same terms to the Count de Clonard; accordingly, on the 27th November, 1767, a *cedula* or decree, was issued in his favour, granting him, for thirty years, the royal mines of Guadalcanal, Cazalla, and Galarosa, declaring the former grant to lady Mary Herbert null and void, as well

as

as all her property therein. By virtue of this patent, the Count de Clonard formed a new company at Paris, in 1768, and in August the works were begun. Hydraulic machines were erected, and they drained the shafts very fast; but the ruinous state of the galleries requiring them to be supported anew, great delays ensued, in so much that the draining of the mine was not entirely compleated till July, 1774. They then made the fatal discovery, that there never existed a vein, or any appearance of such in the tenth gallery, and that the event alluded to, had been a deception to draw in new subscribers to indemnify former losses. This has been a dear-bought experience to the French, who had erected considerable buildings at the mine; particularly at Cazalla, where they had built large furnaces, and a machine for grinding inferior ore, at a league and a half distance, on the rivulet of Guesna. There is no doubt however that the former adventurers must have obtained great quantities of very rich mineral, as is evident by the excavations from the surface, down to the fourth gallery, which diminished towards the eighth, the total depth of the mine being 1200 Castilian feet. The chief engineers are of opinion the antients had great success down to the fourth gallery, and that there, as the vein struck off more obliquely to the South, they were deceived by a branch of the chief vein, which decoyed them as far

far as the eighth gallery, where it finished ; that from thence they proceeded at a great expence in quest of the vein to the tenth gallery without success, and then gave it up.

The present adventurers discovered a very rich mineral in the eighth gallery, which at first appeared to run a great length, but they were soon disappointed, and only extracted 400lb. of mineral, though so rich, that some pieces produced at the rate of 70 to 80 per cent. and on a medium, have been rated at 50 per cent. specimens of which were sent to the court in November 1775, and are to be seen in the royal cabinet of natural history at Madrid, particularly one very curious specimen, like an incrustation of rubies, called *Roscler* by mineralogists, from its rose-colour appearance.

The present workmen have abandoned the old works at Pozo Rico, taken away their engines, and suffered it to fill up, and have applied towards the North, on the direction of the vein from North to South, and in a gallery undertaken two years ago in that part, have discovered appearances which flatter them with success, when they come to a point where several veins reunite.

Their works at Cazalla, where they have extracted some rich mineral, though in small quantities, deviate from the former operations, and are
upon

upon a new plan, proposed by Mr. Duhamel a French engineer, who gives them great hopes, according to all principles of the art; but for the carrying this on, no less a sum is required than 600,000 livres; (£. 25,000 sterling) the ore which has been smelted hitherto at the new foundery, on the river Guesna, has only produced 4852 ounces of refined silver,* an inconsiderable sum for so great an undertaking, attended with such an extraordinary expense. This is the actual state of the celebrated silver mine of Guadalcanal; how far their future operations will be crowned with success, time only will discover.†

* 4852 ounces of silver, at the rate of five shillings per ounce, would only be 1213l. sterling.

† There is no doubt but that the discovery of mines, and their being brought to perfection, is entirely due to the spirit of enterprize amongst individuals, and that the public is frequently benefited by their labours, though private persons may be prejudiced by injudicious and extraordinary expenses. Whatever may happen to the French in this pursuit, the inhabitants of Estremadura however have nothing to fear on this score; nor has the spirit of mining made any great impression amongst them. Don Antonio Ponz relates, with much humour, the notions of the country people in those parts about mines, when being in the Sierra de Gat, and speaking to his landlord on the subject, he answered him, "What, Sir, are you also one of those strollers who lately came here in quest of mines in these desert countries: Ah, Sir! the only mines here are hard labour, and spare diet. I said as much to those people at the

L E T T E R VIII.

Remarkable objects in the course of a tour from Guadalcanal to the city of Seville.

IN travelling to the eastward from Guadalcanal you come in two hours to the town of Alanis, which gives its name to a lead mine about half a league distant from it to the south east, which at present is entirely abandoned. The vein is perceived in the middle of a field, being about two feet broad, and rising that height above ground. Its direction is from south to north, cutting the hard slate that opposes it, as well as the calcareous stone with which that country abounds. It is of a dark colour, and so tough as to require thirty hours in calcining. The ancients followed this vein with a gallery from south to north, but the moderns have only worked one branch of it which shoots off towards the west. These veins may have flattering appearances, but are generally deceitful,

the time, though they assured me that they had discovered an iron mine, and that we should all soon be rich! But alas! they wore out their cloaths, spoiled the fine silk stockings they brought with them, found out their mistake, and marched off, while I remained quiet at home as before." Viage de Espana. Madrid, 1778.

ceitful, though at first the quartz may contain pyrites, but lower down they generally terminate in lead.

Going forward from this place brings you to Cazalla, where there is a mine about half a league from the town, at a place called Puerto Blanco. The vein does not appear above ground, but a few feet from the surface there is a stratum of extraneous earth, different from the other earth seen hereabout. In this mine they find virgin silver, copper pyrites in the quartz, and a little iron.

Two leagues and a half from Cazalla, there is a high mountain called *Fuente de la Reyna*, where the Constantina mine is to be seen, so called from a village of that name, about two leagues distant, and not derived from the Emperor Constantine, who never was in Spain, nor was the founder of it, according to the popular error which prevails on that subject. In former times this mine was worked with great judgment, as appears from the remains of their shafts and galleries. The vein runs from north to south across the direction of the slate, and as the miners term it, has its hat of iron, with pyrites and blend of silver and lead in the spar. Lower down they found silver, called by the Spanish miners *Plata belada*, "frosted silver," and a mine of lead in a small tessellated form. Some years ago an inhabitant of Constantina undertook the

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the

the working of this mine, sunk two shafts, and made galleries on the top of the hill, but abandoned it soon after, perhaps for want of skill, or sufficient capital to go on with the works, though it was thought to deserve more attention, as the ore was good, and they had fuel at hand with a brook at the foot of the mountain, in a fruitful country, with plenty of vineyards.

Two leagues to the westward of Cazalla, there is a copper mine, at a place called *Canada de los Conejos*, which from its appearance should be rich, the vein running from north to south in a pyritous quartz. Half a league from Cazalla there is a mine of vitriol, at a place called *Castanares*, from the number of chefnut trees growing there. The stone is pyritous and ferruginous with deep efflorescencies, or spots of a greenish yellow, and a kind of white powder, which is vitriol divested of the water that crystalises it.

After crossing a mountain, two leagues in length, to the westward of Cazalla, where there are four sorts of the cistus, the terebinthus and other plants similar to those on other hills in this country, you come to a little village, called *El Real de Monasterio*. Half a league from this place, there is a mine of black lead proper for pencils, a species of the *molybdena*, but not of the true sort of *molybdena nigricea fabrilis*, like that from Cumberland, so famous abroad,

abroad, that in France it goes by the name of *crayon d'Angleterre*; they give the name of *lapis*, in Spain, to those black lead pencils, a term they likewise apply very improperly, to black chalk used for drawings, which is a soft stone, called *am-pelitis*.

The country about Monasterio abounds with good oak, of which there is a wood of a league square, with a great many cork trees, from which they strip off the bark every four years, as far as a white sap which they leave on the tree. A liquid humour afterwards issues out again, which thickens with the sun and air, and forms a new bark in about four years more. When the bark is taken off, it is piled up in a pond or ditch, and loaded with heavy stones to flatten it, and reduce it into tables, from whence it is taken to be dried and tied up in bundles for exportation, being then in a proper state for the different purposes for which cork is applied.*

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There

* Mr. Bowles, speaking of the cork tree, page 67, says, That every four years they peel off the bark as far as the epidermis, "De quatro en quatro anos se le despoja de su cortesa hasta el epidermis," which must be a mistake, as the epidermis is the outward skin or bark. He should have said, "hasta al albura," as far as the white sap or sappy part. *Alburnum*. His French translator Le Vicomte de Flavigny has followed him verbally and literally on every occasion.

"Tous

There is a great variety of oaks in Spain, the *roble* is the common English oak with a bitter acorn. The *querigo* is a chefnut-leaved oak, also with a bitter acorn. The *encina* is the ilex, or evergreen oak, and has a sweet acorn, being a stately tree, the wood of which is very solid and hard, but its roots are less so, and are used by turners. The acorns are large and delicate, and so palatable as to find a place at the table in preference to chefnuts. Another species of the ilex has a glossy leaf with sweet acorns, but longer and more pointed than the others; the country people know very well how to distinguish the former from the latter, by the shape of the leaf. Mr. Bowles saw a species of ilex in Catalonia very singular, being only six inches high, yet had fifty-three acorns as large as hazle nuts. § The *mesto*, is so called as it partakes of the *encina* and *querigo*, and has a bitter acorn as well as the *alcornoque* or cork tree.

From

“Tous les quatre ans on le depouille de son ecorce jusqu’à l’épiderme, page 95. See Introduction à l’histoire naturelle et à la géographie physique de l’Espagne traduite de l’original espagnol de Guillaume Bowles.” Par le Vicomte de Flavigny. Paris, 1776.

§ Mr. Bowles says he can give no account of the *Esculus* of Spain, nor its acorns so celebrated by Pliny, who was intendant of Andalusia, and adds, it is a difficult matter to describe those acorns which were eaten in the golden age; nor has Don Quixotte defined them in his immortal discourse to the shepherds on that remarkable period. Don Guillermo Bowles, page 236.

From Real de Monasterio it is a journey of three hours to Callero, about a mile from whence there is a round insulated hill, capped with a vein of calcareous stone running from North to South, where there are both white and grey loadstones, their being of either of these colours is of no consequence, as it depends on the iron being more or less dispersed in small grains; if it is much so, the loadstone is white, if otherwise, abundant, compact and so that the air may have discovered its particles, then it is red without and grey within. There is also an iron mine divested of any magnetic quality. The whole country is covered with oak and cork trees, some of which are so bulky as to be 50 feet diameter, but most of them as well as the oaks, are hollow within, from having been improperly lopped.

Leaving Cazalla and crossing several bleak mountains, it requires nine hours to reach Cantillana, on the banks of the Guadalquivir, the Sierra Morena terminating three leagues before at the narrow pass of Montegil. After crossing the river at Cantillana the face of the country is totally changed; the terebinthus, cistus and lentiscus are seen no more, nor the mountainous plants observed before between Almaden and this place, from whence one may conclude that hitherto the soil was much of the same nature, for in coming from the Pyrenees

Pyrenees to the southward, these sierras are common, but going northward towards France, it is just the reverse, and no real mountains are to be seen in the interior parts of that kingdom, the country consisting chiefly of strata of earth one over the other.

An extensive plain reaches from Cantillana to the city of Seville, which requires five hours to pass over, consisting of poor land, without any stones, but producing a great deal of dwarf palm, or palmetto, the *chamærops humilis* of Linnæus, which covers the ground like fern : the leaves being tied together serve to make besoms sufficient to supply the whole kingdom ; * two sorts of wild asparagus
also

* A very accurate modern traveller, having given a curious account of those parts of Spain which he visited, with a very circumstantial detail of the Palmetto, I presume the following extract from his entertaining and interesting work will not be unacceptable : “The Campina of Marvella, he says, produces an amazing quantity of palmettos, with little dates exceedingly good ; they grow in clusters at the root of the shrubs of the size and shape of a plumb, of a reddish colour, bearing a large stone like the great palm tree date ; the root of the palmetto is very curious, round it are ranged the stamina of each branch of leaves, with a double coating of dry brown fibres, netted like lace, and which are capable of being spun and used as strong thread. Nature, by such extraordinary care in preserving the root of the palmetto dry and free from humidity, shews that a hard
sandy

also grow here with a very thin skin, one green and the other white, which before they bud their leaves have a multitude of flowers as white as snow. In this plain there is a great number of olive trees, whose trunks are scarcely any thing better than bark, from their bad method of planting these trees, they doing no more than taking a stake of an olive tree, of the size of one's arm, slit at the bottom six inches into four parts; they put a stone between the slits, and then set it about two feet under ground, making a trench round it to keep in the water; the top of the stake being uncovered, the rain penetrates that way, and by degrees with the warm air rots the inside.

The sandy soil, little rain, and a hot sun, are necessary to the welfare of this plant; each plant shoots up to the height of ten or fifteen inches, and in a few days after it has attained its growth, divides and spreads itself like a fan into fifty long thin leaves that concenter in the stem. They are of a deep green, exceedingly tough, especially the stalk, which is armed with prickles. They use them as brooms, and eat the fruit which is very delicious, and no way inferior, except in size, to the palm tree date. The root, which is thick and eight inches long, is not only wholesome food, but very palatable, and eat with eagerness by the common people. The inside is tender and sweet, though accompanied with a bitterness, disagreeable to those who are not used to it. The young shoots, pregnant with seeds, are juicy and pleasant." One root may contain two pounds of food. See journey from Gibraltar to Malaga, by Francis Carter, Esq. London, 1777.

The antient and famous city of Seville has been fully described by modern travellers; its streets are paved with pebbles brought from a great distance, for there are none hereabouts. The old Roman walls which are of earth are now so well cemented, that they are become as hard as stone. In the Alcazar, a palace built by king Peter in the fourteenth century, there are baths designed for his favourite Dona Maria de Padilla in a retired situation shaded with orange trees, which still continue to give fruit. The *Solano* wind or South-east, is very troublesome here and all over Andalusia, turning the head and heating the blood in such a manner as to cause various excesses, and were not precautions taken to prevent its effects, they would still be more sensible in youth of both sexes. In the winter season storks are very numerous in Seville, almost every tower in the city is peopled with them, and they return annually to the same nests. They destroy all the vermin on the tops of the houses, and pick up a great number of snakes, so that they are welcome guests to the inhabitants, and looked upon with peculiar veneration. It is said in some parts of Spain, that if they do not appear by St. Agatha's Day, (the fifth of February), the people sling stones at them when they come, and drive them away. The cathedral of Seville is a fine gothic building, with a curious steeple, or tower, having a moveable figure of a woman at top, called *La Giralda*, which

which turns round with the wind. This steeple is reckoned one of the greatest curiosities in Spain, and is higher than St. Paul's in London. * The first clock made in the kingdom was set up there in presence of king Henry the III^d. when the oldest clock we have in England that is supposed to go tolerably well, is in the palace of Hampton Court, and of the year 1540. † Nothing can be more delightful than the prospect of the country round Seville, beheld from the steeple abovementioned, its beautiful and fertile plains, with its delightful gardens and orange groves, convey every idea of fertility and pleasure, with the addition of the river Guadalquivir, which brings ships up to the walls of the city. Amongst other fish which this river af-

* This beautiful tower is 350 feet high. St. Paul's in London, 344. St. Mark's, at Venice, 337 feet. Salisbury steeple, 400 feet; and St. Peter's, at Rome, 432 feet. The traveller who looks on the tower of Seville, will then understand the following passage of Don Quixotte, tom 3, page 162. Madrid, 1771. "Una vez me mando que fuese a desafiar a aquella famosa gigante de Sevilla llamada la Giralda, que es tan valiente y fuerte como hecha de bronze, y sin mudarse de un lugar es la mas mas movible y voltaria muger del mundo." "—She once ordered me to "challenge that famous giant of Seville, called the Giralda, "so valiant and strong as being of brass, and yet without "moving from its place, is the most fickle and variable creature in the world". —

† See observations on clocks by the Hon. Daines Barrington, in the 5th volume of *Archæologia*.

affords, they catch sturgeon, which is greatly esteemed, and in Lent is sent up to Madrid by the dean and chapter of the cathedral, for the king's table on Good Friday, sturgeon being still considered a royal fish as in the days of the Romans, as the Spanish poet Martial has said :

Ad Pallatinas accipenses mittite Menfas,
Ambrosias ornent munera rara dapes. Lib. 13.

L E T T E R IX.

Extraordinary qualities of the River Tinto, with some account of the copper mine of Rio Tinto in its neighbourhood.

ABOUT fourteen leagues from Seville on the frontiers of Portugal, and on the banks of the river Tinto, stands the village of Tinto, which has also given its name to a celebrated and very ancient copper mine that is near it. It must have been greatly esteemed by the Romans as may be judged from the considerable remains of their works still to be seen, which Alonso Carranza has fully described, adding that these mines were not worked in his time, though the remains of the furnaces were found capable of containing four or five hundred quintals of ore, being much larger than

than any used in Spain or the West Indies; the country all round is covered with slag. In the year 1725, a grant of this mine was made by the court to Mr. Liebert Wolters a Swede, who drained the mine of the water, and after that spent large sums of money which he had raised by subscription to very little purpose, and died two years after the grant had been made to him, leaving his interest to his nephew Manuel Tiquet, who continued the works with better success, discovered the vein of copper, and established a manufacture of vitriol of copper of the best sort: but Tiquet had not the good fortune to survive these promising appearances, he died in 1758, and left every thing to his mother and two sisters, the mine being at that time in a flourishing state, producing enough to defray all charges, as well as the engagements entered into for the benefit of the undertaking, having furnished annually for the last ten years about one hundred and forty thousand pound weight of fine copper, which sold for $4\frac{1}{2}$ reals vellon, (about 1s. 4d. sterling) per pound, and paid one thirtieth part duty to the king. The heirs of Tiquet not having received any advantage from the mine, have complained to the court, and new orders have been given to make an inventory of the whole, and report its present situation, when the actual value of this mine will be more accurately known. Don Guillermo Bowles did not

not go there, though invited by the administrator thereof; however he asserts that the copper is difficult to fuse and has a mixture of iron ore, which the miners of Rio Tinto will not agree to; so far from it, they boast of its quality, and even flatter themselves it may contain gold, according to the report of the assay master when the contract was made, which is still to be seen amongst other papers deposited in the archives of the royal mint at Segovia. Those concerned at present are all Spaniards, and no foreigner has any interest therein, or any emolument therefrom, except what might have arisen to some few individuals for manual labour in the mine, but now it is entirely worked by Spaniards, and produces excellent copper. A very curious plate of copper was discovered by the workmen in this mine, on the 31st of July, 1762, three feet long, and two broad, which was found buried ninety feet under ground, and has the following Roman inscription.

IMP. NERVAE. CAESARI. AVG.

PONTIFI. MAXIMO. TR...

OTEST. PP. COS. III.

G. III. PUDENS AVG. LIB.

...PROCVRATOR

IO. POSVIT.

The river Tinto is equally one of the great curiosities of this place. It rises in Sierra Morena,
and

and empties itself into the Mediterranean near Huelva, having the name of Tinto given it from the tinge of its waters, which are as yellow as a topaz, hardening the sand and petrifying it in a most surprising manner. If a stone happens to fall in and rest upon another, they both become in a year's time perfectly united and conglutinated. This river withers all the plants on its banks, as well as the roots of trees, which it dyes of the same hue as its waters, no kind of verdure will come up where it reaches, nor any fish live in its stream, it kills worms in cattle when given them to drink, but in general no animals will drink out of this river, except goats, whose flesh nevertheless has an excellent flavour. These singular properties continue till other rivulets run into it and alter its nature, for when it passes by Niebla, it is not different from other rivers, and falls into the Mediterranean six leagues lower down at the mouth of Huelva, where it is two leagues broad, and admits of large vessels which may come up the river as high as *San Juan del Puerto* three leagues above Huelva. This country is remarkable for several events which make a considerable figure in the history of Spain. In the first place, Huelva is said by some writers to have been the place of nativity of Juan Sanchez de Huelva, the person who is said to have sailed from the Canaries, and to have been driven by tempestuous weather on the coast of America, and after being

ing out seventeen days, was forced back to the Canaries, where meeting with Columbus, was hospitably entertained by him, and dying soon after of fatigue, communicated his discoveries, by which means that great navigator was further confirmed in his opinions about the new world, and encouraged to pursue them. § The writer who relates this event says, that while he was writing his book, a whale having being cast ashore in the night near Huelva, made such lamentable groans, and frightened the people to such a degree, that they imagined these hideous yells could only proceed from the bottom of hell, on which the friars of the convents *Delabella* and *Larabida* at Palos all ran to the churches, fearing every moment to be their last, however they were soon convinced of their ignorance. A description was afterwards published of this whale, from whence it appeared, that it was ninety feet long and thirty feet high, a man could stand upright in its mouth, and there was eight feet distance between its eyes. But these are not objects to perpetuate the memory of Palos, or the

§ See *Antigüedades de Sevilla* por Rodrigo Caro. Sevilla, 1634, who does not tell us on what authority he relates this event of Juan Sanchen de Huelva, which would have been an anecdote of some curiosity; for want of which we may join with Dr. Robertson, who says, that the name of the pilot is alike unknown as well as that of the port in which this supposed personage landed on his return. Dr. Robertson's history of America. Vol. i. Note 17.

the fryars of Larabida, more striking events have handed down their name to posterity; even the ignorant convent of Larabida was at one time governed by one of the most enlightened characters of the age, and to whom the Spanish monarchs had the greatest obligations; this person was Juan Perez, prior of Larabida, the intimate friend of Columbus, who after that great man had received his final answer from court, ventured to write again to Queen Isabella in his favour, and by his interest, and persuasion engaged that princess once more to consider his case: the arguments of Perez were drawn up with such strength of reasoning and ingenuity, that he was ordered to attend the court to confer with the ministry on that subject, the result of which was the final settlement of his plan in behalf of his friend, whose children were at school under his tuition, and the little port of Palos, as most pleasing to them both, was fixed upon for that ever memorable expedition, from whence Columbus sailed in 1492, in quest of a new world for the crown of Castile, verifying that enthusiastic prediction of Seneca,

Venient annis

Sæcula feris, quibus oceanus

Vincula rerum laxet, et ingens

Pateat tellus, Tiphysque novos

Detegat orbés, nec sit terris

Ultima Thule!

SENECAE MEDEA.

LETTER

L E T T E R X.

A tour into the kingdom of Jaen, with some account of its lead mines, more particularly that of Linares.

THE little fairy kingdom of Jaen, which now makes part of Andalusia, is in a manner surrounded by a chain of mountains, formed by the Sierra Morena, Segura, Quesada, and Torres, separating it from the kingdoms of Cordova, Toledo, Murcia and Granada, while the river Guadalquivir divides it from the kingdom of Seville. The face of the country is rugged and hilly, with no other vallies but such as have been formed by torrents of water, according to the more or less resistance of the soil, or the hardness of the rocks, for the earth not being divided in strata the heights crumble away in proportion to their moisture, and the tops of the hills not being connected nor contiguous, have decomposed at a variety of periods, from whence those singular gaps and passes have resulted, which now form the roads in this petty kingdom, once the domain of a Moorish chieftain, and for a long course of years the theatre of chivalry, honour, and love.

In the centre of this cragged kingdom, about three quarters of a league from the village of Linares,

nares, there is a small plain, situated in the highest part of the country, which affords an extensive prospect, closed by barren hills and steep rocks, with a view of the city of Jaen the capital, as well as those of Anduxar, Baeza and Ubeda. At the end of this plain the hills are pierced like a sieve, with numberless shafts and excavations of mines undoubtedly the work of the Moors, for surely the Romans could never have proceeded in so awkward a manner; these Mahometan princes must have struggled hard to extract from the bowels of the earth those revenues which its dreary surface refused them, and probably they supplied the neighbouring states with silver, copper and lead; some of which minerals are always found here, and occasionally all of them together. In ranging the hills it is extraordinary to observe the prodigious number of shafts made in direct lines at four paces distance from each other; there are above five thousand of them, and no doubt the violence of the water gushing through the hills first laid open the veins and led to the discovery of the mines, but when the Moors improved upon these advantages with which nature had favoured them, they did it with all the ignorance and unskilfulness to be expected from their barbarism. I shall only speak of two of those veins, one that begins in the valley on the West side of the plain, and the other on the East. They each have a parallel direction, at
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about a thousand paces distance, running from North to South and inclosing the plain between them.

There are two other modern mines, but one of them does not enter into the plain, and the other is so low, that it will be difficult to work for any time, as there is no issue for the water, nevertheless the former miners extracted from hence the lead which was sold to the king before his majesty took those mines into his hands, and one may see by their labours that they were exact imitators of their predecessors the Moors, following their method, and making the same range of shafts in pursuit of the vein on the hill, almost as far as the village of Linares.

No mine of the kingdom of Jaen is found in calcareous rock, that of lead abovementioned is in common grey granite, at times sixty feet deep, at others only one; with every gradation between these extremes, the stratum in which the ore is enveloped is generally clay, though sometimes it runs through granite which puzzles the miners for want of a regular method to follow it; however they are right in general when they tell us that regular veins have two strata, one lying above called the roof, and the other underneath termed the floor, both together forming the trunk of the vein, it being thought the roof serves to cherish it, while the
 floor

floor answers the purpose of a basis : in Jaen they sometimes find the ore in fragments or masses, for which no certain rules can be given ; it is fortunate to meet with these masses, Don Guillermo Bowles says that one was found in his time, so remarkably rich that in four or five years it yielded an extraordinary quantity of lead, in a space about sixty feet broad and as many in length ; adding that though he did not recollect the exact number of quintals, he could aver that more lead was obtained from that single place, than from the mines of Freyberg in Saxony, or those of Clonsthal in the mountain of Hartz, in the course of twelve years. It is a true *Galena*,* of a large grain, yielding from 60 to 80lb. of lead per quintal, and they fuse it in the open air for want of a laboratory at Linares.

The first use made of the lead is to run it into shot of all sizes for sportsmen, which is sold every where in Spain for the king's account. The potters are next supplied, who use it to varnish their wares, another part is pulverized for writing sand, the remainder is sent to France and sold at the fair of *Beaucaire* : though it is a *Galena*, as it only con-

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tains

* *Galena* is the name of a lead ore consisting of cubic particles, and sometimes tessellated. It is the most common ore of lead, if the cubes are large the mineral is richest, and when small and grey, contains a little silver, but in such small quantities, as not to be worthy of notice.

tains three quarters of an ounce of silver per quintal, it is not worth while to copel it.

The country produces the same kind of plants as at Almaden, to which may be added the common or wild camomile, a plant generally scarce in the meridional provinces, yet so common here that the whole kingdom might be stocked with it : they have also great plenty of game.* This little kingdom is famous in the annals of Spain for that memorable victory at *las Navas de Tolosa* in 1212, over the king of Morocco, obtained by Alfonso the IXth king of Castile, assisted by Peter the IIth king of Aragon, and Sancho VIIth king of Navarre, in which an incredible number of Moors were destroyed. After the battle the king gave orders to his general Don Diego Lopez de Haro who commanded the van of the army, to dispose of the booty, as the kings of Aragon and Navarre had consented to abide by his decision, upon which the gallant General, knowing the magnanimous disposition of his sovereign, decreed, that the kings of Aragon and Navarre should have whatever was found within the chains and palisades of the enemy's

* When Mr. Bowles travelled this way, at a miserable venta they gave him an omelette for dinner made with partridge's eggs, and they shewed him five hundred of those eggs in the house for the same purpose. Every peasant is a sportsman and has the use of his gun, for game laws are unknown.

my's camp, the remainder of the spoil to the soldiers in general, and for the king his master what he thought the most honourable of all, *The glory and honour of the day*.* This commander having been reflected upon for having just before lost the battle of Alarcos, out of jealousy, because the king of Castile had said the nobles of Estremadura were as good as those of Castile; his son Don Lopez Diaz de Haro, came to him the eve of the battle of Tolosa, and said, Sir, I hope you will not suffer me to-morrow to be called the son of a traitor; No, replied the general with warmth. *Llamarte an hijo de puta pero no hijo de traydor*,† which sharp answer proceeded from the conduct of the lady Maria Manriquez his

* The king of Navarre being the first who broke down the chains of the Moorish camp, altered his coat armour in memory of that day, to a field gules traversed with a chain of gold, having a rich emerald in the centre, being part of the spoil, and a piece of the chain was fixed round his tomb in the church of St. Mary at Roncesvalles. Many Spanish knights did the same, or added chains to their arms from having been present on that memorable day, particularly those of the names of Romeu, Mendoza, Stuniga, Munoz, Peralta, Meneses, Maza, Abarca, Villaseca, Otazo, and Irrazaval de Vergara. The royal standard of the king of Morocco, which is *azur* with a crescent *argent* and five stars *or*, was suspended over the tomb of Don Diego Lopez de Haro, in the choir of the cathedral of Toledo.

† “ They may call you son of a w---, but not son of a traitor.”

his wife, who fled from her husband with a blacksmith of Burgos, but afterwards repented, and by way of atonement in her last moments ordered her corpse to be placed with her effigy in marble, without the church door of the convent of Haerta, that every one might trample on her tomb, and take warning from her weakness, which being long after observed by the Emperor Charles, he ordered her remains to be removed into the church with her ancestors, saying she had now done penance enough.

A more fatal instance of love is recorded in the chronicles of Jaen, which the Spanish bards have made a perpetual theme of their ditties, lamenting the fate of that unfortunate lover *Macias* the poet, one of the esquires of Don Henrique de Villena, grand master of the order of Calatrava.* It seems Don Henrique had a beautiful handmaid who had given great encouragement to Macias, who on his side had improved every opportunity from the fair object of his love, and although the grand master had disposed of her in marriage to a principal gentleman of Porcuna in the kingdom of Jaen, it had little effect on their mutual affection, which being reported by the husband to Don Henrique de Villena, he, finding all admonition vain, cast Macias into prison at Arjonilla, a town belonging to the knights of

* Don Henrique de Villena died in 1434.

of his order, five leagues from the city of Jaen, where the distracted enamorado had no other alleviation than writing letters to his mistress, and composing love songs in her praise, replete with the most tender expressions, as well as the hardship of his fate, which reaching the jealous ears of her husband, he mounted a fleet courser, and armed with his lance, rode up to the windows of the prison, where fired with resentment on hearing the name of his wife, he darted his lance at him with fury, and pierced him through the heart, then clapping spurs to his horse, fled into Grenada. The unfortunate Macias was honourably interred in the chapel of St. Catharine belonging to the castle of Arjonilla, and the bloody lance was suspended over his tomb, with the following inscription :

Aquesta Lanza fin falla
 Ay coytrado !
 Non me la dieron
 Del muro,
 Nin la prise yo en batalla
 Mal pecado !
 Mas viniendo a ti seguro,
 Amor falso y perjuero,
 Me firio, e fin tardanza,
 E fue tal la mi andanza
 Sin venturo !

LETTER

L E T T E R XI.

Journey from Merida to Malaga.

IT is a journey [of seven hours from Merida to Talavera* through a sandy plain traversed by the Guadiana, which has a great many islands covered

* Different from *Talavera de la Reyna* on the Tagus in New Castile, famous for its fine earthenware and silk manufacture: these belonged to the crown till sold in 1762, to a merchant of the name of Ustariz, for 7,410,000 reals vellon, £83362 10s. sterling. Their annual consumption is 21000lb. of silk, 4000 marcs of silver and 60 of gold, having 336 looms and about 1438 workmen, chiefly Spaniards. They make annually 55000 varrs of gold and silver lace, 560000 varrs of ribbands, 5000 pair of silk stockings, 32000 varrs of taffety, 8200 varrs of velvet and velverets, 2300 varrs of gold and silver stuffs, 2000 varrs of velverets mixed with silk, 10500 varrs of damasks, tabbies, &c. exclusive of gold and silver twist buttons, handkerchiefs and other less articles. The greatest encouragement is given to the raising of mulberry trees for the silk worms; many plants of which have been distributed by the proprietor, at his own expense, to all the villages round him.

They have remarkable processions here at Easter, which go by the name of *mondas de Talavera*, when all the country people assemble and form a procession with garlands of flowers,

ed with flocks of sheep and numerous herds of cattle, that are often carried away as well as the shepherds by the sudden increase of the river: the plain from Talavera to Badajoz produces nothing but broom. At this last city the soil changes again, and the calcareous earth, stone, and rocks make their appearance once more. Estremadura is the only part of Spain where they have neither salt springs nor rock salt, which obliges the inhabitants to procure those articles from their neighbours. This large and fertile province, reputed about fifty leagues in length and forty in breadth, so happily situated for every branch of culture, and where the Romans seem to have taken such delight, is now thought not to contain above a hundred

flowers, each division guided by a person carrying a staff covered with flowers at top, and making an offering of them to the Blessed Virgin, according to the customs of the Pagans who used to do the same to their gods; perhaps the difficulty of abolishing these ceremonies, says Don Antonio Ponz, has engaged the clergy to convert them into obsequious rites to the Blessed Virgin, as the church has wisely done with other heathenish customs equally difficult to eradicate. *Viage de Espana* tom. 7. Madrid 1779.

Two leagues from *Talavera de la Reyna* you find *Talavera la Vieja*, famous for the remains of a temple as well as several Roman inscriptions and other antiquities, which have been described and published with copper plates, at Madrid, in 1762, by Don Ignacio de Hermosilla of the secretary of state's office for the West India department.

hundred thousand inhabitants, a number comprised in many capital cities; but if their numbers are small, they value themselves on the quality of their heroes, having furnished a Cortez, a Pizarro, and the unfortunate though great Velasco Nunez de Balboa.*

The antient city of Badajoz the *Pax Augusta* of the Romans, called *Badaugos* by the Moors, and now Badajoz is the frontier town next to Portugal. The bridge over the Guadiana has twenty-six arches, and was built by Philip the II^d. Numerous families of Negroes and Mulatoes are settled in this country between Badajoz and Zafra: this last town with the dutchy of Feria is now fallen into the ducal house of Medinaceli. Joining to the duke's palace, in a church belonging to a convent of nuns, there is an elegant marble monument to the memory of an English lady of the noble family of Harrington, with the following inscription:

AQUI YACE DONA MARGARITA HARRINTON HIJA DE JACOBO HARRINTON BARON DE EXTON, Y DE DONA LUCIA HIJA DE GUILLERMO SIDNEI VISCONDE DE LISLE, BARON DE RENHURST, NACIDA EN INGLATERRA, MUGER DE DON BENITO DE CISNEROS,

* See the character of Nunez de Balboa in Dr. Robertson's history of America.

NEROS, CUYAS SINGULARES VIRTUDES
 PUDIERAN HAZERLA INSIGNE QUANDO
 LE FALTARAN TANTOS TITULOS DE NO-
 BLEZA PARA SERLO. ROGAD POR ELLO
 A DIOS. MURIO EN MADRID ANNO DE
 1601.

DONA JUANA DE FERIA, PRIMA, ALBA-
 CEA Y PATRONA, EN CUMPLIMIENTO DE
 SU AMOR Y DEL TESTAMENTO MANDO
 HAZER ESTA CAPILLA Y SEPULTURA.

IN ENGLISH.

Here lies Margaret Harrinton, daughter of James Harrinton, Baron of Exton, and of Lucy, daughter of William Sidney Viscount Lisle, Baron of Renburst, born in England, Wife of Don Benito de Cisneros, whose singular virtues would have rendered her illustrious, even if her many other titles had been wanting. Pray to God for her. She died in Madrid in the year 1601.

*The lady Jane de Feria, cousin, executrix, and patroness, as a proof of her love, and in compliance with the will, ordered this chapel and monument to be erected.**

* There seems to be some error in this inscription, it was John Harrington, who the first of James I. was created baron Harrington, of Exton, in 1613. He died at Worms in Germany, his issue John survived him but a few months; nor does it appear that Sir William Sidney, of Penshurst in Kent, was ever raised to the peerage, though his descendants

Proceeding from Zafra to S^{ta}. Marta the country improves for about five leagues to Zarza del Angel, then you pass by Monasterio to Fuente de Cantos where the Sierra Morena begins: S^{ta}. Olalla

scendants might have had the title of Viscount Lisle and Baron of Penhurst.

Dona Juana de Feria was the only daughter of Sir William Dormer by his first wife Mary Sidney, whose youngest sister was mother of Margaret Harrington. She was maid of honour to queen Mary, and when the Conde to Feria came into England as ambassador to the queen in her last illness from Philip the II^d, he fell in love with this lady, and married her, and they had a son born at Mechlin, September 28th, 1559. The Conde was made a Duke eight years after, and died in 1571: and the family is now extinct. A picture of the Dutchess of Feria, supposed to be of the hand of Sir Antonio More, is in the possession of the Rev. Mr. de Salis. She is in the dress of a nun, with this inscription on it, D. Jana Dormer Feriæ Ducissa Vidua D. Gomezii Suarez de Figueroa y Cordova Feriæ Ducis æt. 35. A. D. 1572. As she retired into a convent the year after her husband died, perhaps this might be the reason that she did not assume the title of Dutchess on the monumental inscription to the memory of her cousin Margaret Harrington, who probably went to Spain with her. The Jesuit Ribadeneira, who came into England with the Conde de Feria, as his chaplain, but principally with a design to procure a settlement here for his order, continued his attachment to the Dutchess of Feria, and dedicated to her his second volume of lives of saints, which is dated at Madrid June 15, 1608. I am indebted for this communication to my worthy friend the Rev. Mr. John Bowle, of Idmiston.

la is the first village in the kingdom of Seville, it being a dismal and melancholy journey of ten hours over these dreary hills to Castel Blanco, with the same plants as at Almaden, to which may be added the wild germander. Great efforts have been made to improve the waste lands of this horrid Sierra, and give a new face to the country, for which purpose foreigners have been invited to settle there, and great exertions have taken place for some years past. In the year 1767, eleven towns and five villages were already formed in the Sierra Morena, as well as four towns and fifteen villages in that part which divides the kingdom of Cordova and Seville,* making all together 2446 families, consisting of 10490 persons, of which 8175 were labourers, and 2217 mechanics, exclusive of journeymen and servants. They have built twenty-four parish churches and chapels, 2200 houses, and fifteen inns, planted 200,000 olive trees, above half a million of mulberry trees, and as much more of various kinds of fruit-trees, elm, vine, &c. their harvest consists at present chiefly of wheat, barley, peas and beans, producing one year with another five hundred thousand *fanegas*; the vines begin to prosper, and are expected

* See in Mr. Swinburne's travels, a description of the new settlement of La Carolina, one of the principal places of this establishment, which he passed through going from Cordova to Madrid. Many of these people are since dead through intemperance and change of climate.

expected to become a considerable object, and they have moreover established many branches of silk and woollen manufacture.

After traversing the Sierra Morena it is no small relief to enter the extensive and fertile plain of Seville, which leads to that capital city, and makes some amends to the traveller for the scene of desolation he has passed. You pass through a beautiful country for three days, till you come to Antequera, situated on a hill at a league distance from a high mountain consisting of an entire block of flesh-coloured marble, which must be crossed on horseback, to go to Malaga; several springs which issue from it form themselves into a rivulet, whose banks are lined with perriwinkle, bulbous iris and the fallow leaved hare's ear: the rocks are mostly covered with the *lichen* called *orchilla* by the Spaniards, but as the sort from the Canaries is preferred both in England and France, the gathering of it is totally neglected in Spain. That sort which has little white specks upon it like warts is thought to be the best; it grows on the highest rocks on the sea coast, and fixes its roots in the cavities of the rock. Its common length is from one to three inches, and makes a considerable part of the commerce of the Canaries, where it is gathered at all times of the year; some goes to the Mediterranean markets, but the largest quantity for England, where they have a particular method of

of preparing it with human urine and other ingredients, so as to make it of great use in dying fine purples and bloffom colours.*

The hills are covered with vineyards, and as you descend into the low lands, the eye is enraptured with the most beautiful objects; the dreary month of January in a northern climate is here a scene of delight, the fields are full of perriwinkle, myrtle, oleander, and lavender, with many other flowers in full blow, at that early season, and this enchanting prospect continues to Malaga, an antient and celebrated city, taken from the Moors, in 1487, by Ferdinand and Isabel, after a most vigorous defence, and having been 772 years in their possession.

* The name of *orchilla* was perhaps given it from the island of Orchilla, one of the Leeward islands, near the coast of Terra Firma, in America, where probably it was first discovered.

The sort used by the dyers is the *Lichen Calcarius* of Linnæus, being so peculiar to limestone rocks that wherever that stone occurs among others, it may be distinguished at the first view by this plant growing upon it. When dried, powdered and steeped in urine, it is used to dye scarlet by the Welch and the inhabitants of the Orkneys. The watry kind is the *lichen pertusus* of Linnæus. Another sort called *tartareus* by that great writer, is common in Derbyshire, and gathered by peasants who sell it for a penny a pound to the dyers, who use it for purples. It is so plentiful that they can collect twenty or thirty pound a day. See Dr. Withering's botanical arrangement, &c.

on. A city not less remarkable for its opulence and extensive commerce, than for the luxuriance of its soil, yielding in great abundance the most delicious fruits; whilst its rugged mountains afford those luscious grapes which give such reputation to the Malaga wine, known in England by the emphatical name of *Mountain*. These valuable mountains have moreover a peculiar advantage, that the drought which is so prejudicial to corn, contributes principally to the goodness and flavour of the grape, as the surrounding mists afford every necessary refreshment, and are more serviceable than rain, which would rather injure the roots, by washing away that light coat of soil with which they are so sparingly provided.

But before I leave Malaga I cannot omit speaking of those excellent and remarkable potatoes peculiar to that district, and in so great esteem in other parts of Spain; they are sweet and luscious, of an oblong form and of a bright yellow colour like gold, and when roasted eat extremely well with wine and sugar; they are equally an American production though different from the common potatoe which is only known of late years at Madrid, and not in any other part of the kingdom, except Galicia where they are common as having been first brought there by the Spaniards, and from thence conveyed originally to Ireland.

About

About three miles to the westward of Malaga, there are gardens about a hundred paces from the sea, and on a level with it, inclosed with the Indian fig or prickly pear, and with the aloe, whose sharp pointed leaves serve as an excellent fence against cattle; several plants grow under their shade, particularly two sorts of mallows, spurge, geranium, marsh marigold, borragé, asphodel with onion leaves, bastard dittany, sorrel, clary, goldylocks, goosegrass, avens, nightshade, shepherds purse, fumitory, and white asparagus; many of these even grow in the burning sands on the sea shore, and are in flower in January, also a great deal of celandine the same as in the interior parts of Spain.

Further on to the westward about two leagues from Malaga, there is a cavern where the water forms enormous pieces of calcareous spar,* which takes a beautiful polish, and much of it has been used in the royal palace of Madrid; some pieces are of a white ground, with veins of different colours, but in general the ground is grey, with a pleasing clare obscur happily ramified with white,

A a at

* Mr. Bowles's editor, page 121, very improperly calls this spar by the name of *Alabastro calizo*, "limy alabaster;" as there is no such thing in nature: it must either be a marble, or an alabaster, and cannot partake of the properties of both, but from the mode of its formation it appears to be a spar.

at other times a dark grey interspersed with veins of a brilliant white. This cave lies immediately under a considerable bed of lime rock, in a plain about a hundred paces from the sea, and half that distance from a chain of limy hills, the decomposition of which produces the spar above mentioned.

L E T T E R XII.

Describing the country between Malaga and Cape de Gat.

THE first remarkable place to the eastward of Malaga is the town of Velez Malaga, near which the captive in Don Quixote is supposed to have landed from Barbary, with the beautiful Zorayda. A few leagues further is the little port of Herradura, where a fleet of gallies was lost in 1562 under the command of general Don John de Mendoza who had sailed from Malaga with twenty-four gallies, having 3500 soldiers on board, and finding the wind contrary, put into the Herradura, where he came to an anchor, but it blew so hard that twenty-three of the gallies were driven ashore and lost, and all the crews drowned.* This port is not laid

* Vida de Felipe II. por Luis de Cabrera. Madrid, 1619. Also Guerra de Granada por Hurtado de Mendoza.

laid down on Lopez's map of Spain, but may be seen on the French chart of the Mediterranean, dedicated to the duke of Choiseuil in 1764, by Joseph Roux at Marseilles, hydrographer to the king, and is an exact copy from Michelot, who was pilot of the galleys to Lewis the XIVth.

Further on, Motril is another little sea port, and on the road to it, one may see samphire, orache, dock, thornapple, and cardomindum growing in the sands on the sea shore, with the Indian fig shooting out amidst the rocks dashed by the waves of the sea. In different parts of this coast almost as far westwardly as Gibraltar there are above twelve sugar mills called *Ingenios*. In Motril only there are four of them, which cost at least eight thousand pistoles each, sugar having been made there time immemorial as perfect according to the opinion of good judges as any imported from the West Indies, which is not so extraordinary when we consider that the first slips of the cane were sent from hence to the Canary islands, from whence Nicholas de Ovando, governor of Hispaniola, introduced them in 1506 into his government, where they thrived surprisingly : but in Spain their cultivation

A a 2

Valencia, 1776. This event is hinted at in Don Quixote, where Sancho speaks of Don Alonso Maranon, Knt. of St. Jago, who lost his life there. Vol. 3. page 412. Madrid, 1771.

vation is disregarded, though the soil of the meridional provinces, the temperature of the air, and the glowing heat of the sun are well adapted for the cane and many other productions of South America, which might be brought to perfection, were industry and encouragement in any proportion to the advantages of nature. With respect to sugar it has been neglected through political motives, and the canes have been rooted up to make way for the vine : even the pine apple, which was first introduced from the Spanish settlements, was unknown in the royal gardens of their monarchs, till within these few years, that Boutelou, the king's under gardener, raised them at Aranjuez.

From Motril to Almeria you range along the mountains, many of which are of marble to the very summit, the strand is level and sandy, with very little earth, except near Almeria, which ancient city was conquered from the Moors in 1147 by Alfonso, styled the emperor, assisted by Garcias king of Navarre, Raymond count of Barcelona, and a fleet of Genoese ; these last taking for their share of plunder that beautiful vessel, supposed to be an emerald, which they still so carefully preserve in their treasury. They make salt-petre of the first boiling at Almeria, which is sent to Granada to undergo a second process, without the assistance of fixed alkali, nor does the earth from whence it is collected contain any gypsum.

About

About half way towards Cape de Gat there is a large plain so full of garnets that a ship might be loaded with them ; they are likewise to be found in a gully formed by the waves at the foot of a hill in that neighbourhood. The sea sometimes throws up worms hereabouts four or five inches long, and one broad near the belly, with circular loins and the body divided into ringlets, which emit a purple liquor flowing from every part when cut into pieces ; of this species there are three sorts, viz. the common *murex* which generally remains at the bottom of the sea, the *nautilus* which by help of a fin sails like a ship, and the worm without any shell thrown up by the sea on this coast.*

The famous mountain of Filabres is about three leagues from Almeria, but it takes ten hours in going to it, the road is so turned by the many hills to be passed before one reaches it. This amazing and stupendous mountain is a solid block of white marble about a league in circuit, and two thousand feet high, without the least mixture of any other stone or earth, the marble appearing in many places where neither the wind, rain, or any of those causes which destroy the hardest rocks, have yet made the least impression. On the side towards the village of Machael, lying at the foot of this mountain, a great part of the kingdom of Granada

* Don Guillermo Bowles. P. 126.

nada is discovered, which is mountainous, and resembles the waves of the sea in a storm. On the other side the mountain is cut almost perpendicularly, and from its prodigious elevation affords a most awful prospect, with the city of Gandia, which though at a distance, if considered with a bird's eye view, seems only half a league off. The Sierra de Gador is another immense mass of marble, of which they make excellent lime. It dissolves intirely with acids, without leaving the least residue of clay or other matter, whereas the stone in other parts of Spain, particularly in Valencia, has a mixture of clay or sand, of these we are to understand the Spanish proverb, with respect to ore, which is literally true in that kingdom, *Donde hai yeso y cal, no hai mineral*; viz.

“ Where of gypse and lime there's store,

“ Don't expect to meet with ore.”

Notwithstanding the goodness of the marble of Gador, there is a great difference between the solidity of the old houses in the village, and the modern ones, the former being much more durable, owing to the builders having used the sand of the river Rambla, while the present generation, either from supineness, or ignorance, make use of sea sand, which from its saline nature attracts moisture, and dissolves, defeating the union necessary to be supported with the lime, which is not the case with fresh water sand.

Amongst

Amongst other natural products of this country, the *Esparto*, or matweed,* grows in great plenty, and deserves particular attention ; they not only make cordage with it for boats, but also mats for floors, sackcloth, baskets for raisins, and above forty other articles in domestic œconomy. They even spin it like flax, which is made into linen, for which secret the inventor has been amply rewarded by his present majesty, and a large sum advanced him to set up his manufactory.

Cape de Gat is a huge promontory, consisting of an enormous rock, of a singular nature, different from any other appearance in Spain, eight leagues in circuit and five broad ; the first object that strikes the eye is a rock two hundred feet high, about fifty paces from the sea, all crystalized in large stones of the size of a man's leg, with four or five plates chased one within another, of a cinereous colour, from eight to fourteen inches long, with a large grain that will take a good polish. Precious stones are said to be found in the mountain of Bujo, in a cavern with an entrance about fifteen paces wide and twenty feet high, where the agitation of the waves is very great in bad weather ; Mr. Bowles went in there but could discover nothing of consequence. On the outside a large white patch serves as a land mark to mariners, and from thence

* *Stipa tenacissima*. Linn.

thence called *Vela Blanca*. This is what is properly called Cape de Gat. Near the *Torre de las Guardas* there is a bed of jasper of a white ground veined with red, and further on near the *Torre de Nefte*, a low rock is seen almost covered with a stratum of white cornelian. They gather a black sand not far from the *Torre de San Joseph*, which proceeds from the demolition of the rock, added to the constant percussion of the waves, and is sold to throw over writing. They might find another sort of sand very near this place, less angular, which would answer for hour glasses, but they still import it from Germany for this purpose.

In the centre of this promontory there are four hills near to each other, called the Sacristan, the Two Fryars, the Captain, and the White Mountain, but nothing remarkable is to be observed from their outward appearance.* The other side of the promontory, after passing these four hills, is called *El Puerto de la plata*, where the Moorish Corsairs lie lurking for Spanish vessels to intercept them, and carry their crews into dire captivity.

There

* Mr. Bowles says that Cape de Gat is the most meridional point of Spain, as may be observed by looking on the map, but such an inspection will convince us of the contrary, Europa Point at Gibraltar is more so, and often said to be the most southern point; but perhaps the *Punta de Carnero*, on the Algeziras side of the Bay is yet further to the southward.

There is a rock near this *Puerto*, which extends towards the sea, and called *El monte de las guardas*, where they find amethysts, but still more abundantly in a stratum of quartz of very difficult access, being in a precipice twenty feet high. The true amethyst resembles a pyramid reversed, while the rock crystal has six faces, and is larger at bottom than at top. But there is no probability of further researches for precious stones, or even for marble, as the exportation of this latter has been lately prohibited, by which a total stop has been put to the labour and industry of the inhabitants in that valuable branch. Were we to believe the boasted accounts of the green jasper found in a gully called *El barranco de San Juan*, in that part of the *Sierra Nevada* through which the river Genil passes to Granada, it is an universal remedy for all manner of complaints, and has singular effects if wore over the stomach, or applied to any part of the body where its efficacy is required. There are two sorts of it, some having black veins and very hard, others with white veins, less so, but reputed equally efficacious.*

LETTER

* All its supposed virtues are set forth in a paper printed at Granada, without any date, entitled, "*Maravillosas virtudes de la Piedra Jaspe verde sacadas de muchos autores y confirmadas con muchas experiencias.*" It is not only used in the applications abovementioned, but pulverized, and when mixed with milk cures old wounds, the bites of serpents,

L E T T E R XIII.

Excursion from the city of Granada to Cordova and Anduxar, in Andalusia.

IN going from Granada to Andalusia, the first stage is at Loxa, a journey of ten hours, through that beautiful plain called *La Vega de Granada*, and then ascending a mountain, through another cultivated vale, with wheat, flax, hemp, and pulse. Loxa is a middling town, pleasantly situated on a high hill of conglutinated stone, which forms a kind of *brechia* or pudding-stone, in the centre of olive grounds having plenty of fruit, notwithstanding its elevated, cold and dry situation.

From

pents, the piles, and is good for the sight; but what is best of all, an excellent remedy against enchantments and witchcraft! John Fragofo, in his *Cirugia universal*, speaks of it in his index of simple remedies under the word *jasse* on the authority of St. Epiphanius. Morales also in his his "historia medecinal de la que se trahe de Indias," fol. 18; as also Galen, lib. 9, de facultatibus simplicium. Pliny, lib. 36, cap. 7, and lib. 37, cap. 9. Discorides, lib. 5, c. 117, and his commentator *Laguna*. According to the paper abovementioned, it has been in great demand since the year 1772.

From Loxa to the westward, the country is fertile, producing wheat and barley, in a limy soil well furnished with oak. The soil of these hills seems to proceed from the decomposition of former rocks, many of which appear in broken lumps, intermixed with the arable land. Alameda is the first town in the kingdom of Seville: swallows make their appearance there in February, a few corn fields are seen in the low lands, but in general the western boundaries of Granada are made up of steep rocks and craggy mountains. The *Solano* winds prevail much here, and do a great deal of mischief, destroying the harvest if they blow early in the season. The country people are fond of tobacco, and though they have near them those excellent wines of Malaga and Xerez, they seldom or ever drink them, preferring distilled liquors, * without any visible prejudice, for the men are robust, and the women have good features, with lively sparkling eyes full of expression and fire. The country is extremely pleasant to Herrera, with a white and red earth which is remarkably fertile, divested of any loose stone, pebble, or flint, so common in other parts of the kingdom. This rich soil is a perfect marl, and under the olive tree yields plentiful crops of wheat and barley. Estepa, about a league from
Herrera,

* Called in Spain *rosoli* and *mistela*.

Herrera, stands in a picturesque manner, on the top of a hill surrounded with olive trees. The olive of Estepa is small, but delicious, and gives an oil as clear and delicate as that of Valencia. The Seville olive, though often as large as a dove's egg, does not yield near so good oil, for which reason they are more frequently pickled. Even so far back as the days of Cicero they were in high estimation, for in writing to his friend in Andalusia he compliments him on being intendant of so fertile a province, and reminds him to send him some Seville olives to Rome. They are very careless notwithstanding in making their oil, leaving the fruit a long time collected in heaps, so that it rots before it is ground, part of the oil turns into mucilage, and acquires a rank and disagreeable flavour, and as there are few mills in proportion to the quantity of fruit, each person is obliged to wait for his turn sometimes for months, from whence in this warm climate a fermentation ensues, which of course occasions bad oil. Others deceive themselves through a principle of avarice, for though the olive yields more juice from having lain by for some time, it is at the expense of its quality, such thin fermented matter hardly deserving the name of oil, for which reason, and from their little care in putting it into proper vessels, and carrying it about the country in skins, the oil in general is wretchedly bad at Madrid.

The

The olives are gathered from the middle of October to the middle of November. If a good year they sell from 20 to 24 reals the arroba (about 5s. 4d. sterling) but in years of scarcity will rise to 36 or 40 reals. A *fanega* of olives will yield an arroba of oil. In the south of France they are not gathered till they are perfectly ripe, and have acquired a reddish hue inclining to black; if this period passes, they wrinkle, moulder, and rot. Those that are green give a bitter taste to the oil, and they carefully separate such as are worm-eaten, which would vitiate the flavour of the sound ones, they grind them as in Spain, then the substance is laid under the press; the first juice that runs out is called virgin oil, and is the most delicate for the table, its goodness arising from the freshness of the fruit. The second sort is obtained by pouring boiling water on the substance remaining in the press; but this oil is like that of Spain, acrimonious, and subject to corruption. In general all oil obtained by fire or hot water, is of a bad quality; much will also depend upon its being put into proper vessels, clarifying it with judgment, and placing it in commodious cellars with a proper medium of heat and cold, both extremes being equally prejudicial. In the year 1769, Mr. Sieuve of Marseilles, presented a memorial to the academy of sciences, describing the best method to make oil, having invented amongst other improvements,

ments, an instrument to separate the fruit from the stone, by which the olive is freed from those viscid, fetid, and sulphureous particles which are found in the stone, and alterate the juice of the fruit; but these hints seem to have little weight with the Spaniards, who continue the old method, implicitly following the customs of their forefathers.

It is five hours journey from Herrera to Ecija, agreeably situated, but one of the hottest towns in Spain. The horses of Ecija are reckoned the best in Andalusia, and remarkable for the goodness of their hoofs, owing to the dryness of the ground, while at Seville, and in the flat country on the banks of the Guadalquivir, they are spongy, and liable to crack in hot weather; but in point of shape, the beautiful horse of Cordova is the most perfect, though of late their studs are greatly neglected.*

Nothing

* There is a curious Arabic manuscript in the Escorial, marked DCCCXCVII. on horses and horsemanship, written by a Moorish general, and dedicated to Abdalla king of Cordova IIIId, of the race of Bennaflaret, who reigned A. D. 1301, which if ever made public, might perhaps illustrate what we have already received from the illustrious names of Newcastle and Pembroke. The title as given by Casiri in his catalogue of Arabic manuscripts in the escorial is as follows. "Theatrum equestri Abu Mahommed Abdala Latkamita Cordubensi, viro genere dignitate

Nothing can be more delightful than the face of the country from Ecija to Cordova, a space of nine leagues, yet without a single village, or even a spring; for which reason they must have a great deal of rain to have any crop, but when they are blessed with plentiful showers their harvest is very great. The city of Cordova is seated on the banks of the Guadalquivir, about a league from the Sierra Morena, and has ever been famous for the magnificence and splendor of its nobles. Even the Jews in former times are said to have vied with the others in pomp and parade. § Its cathedral is famous for its antiquity and structure, with numerous pillars of different marble, which seem to have been taken from old Roman structures.

dignitate ac laude bellica præclaro. Is naturas equorum, proprietates, colores, formas, adnotatas etiam multis eorum nominibus erudite atque eleganter hoc opere perfectas librum suum Regi Abdalla Mahommed Ben Naffor Almanzor dedicavit. Accedit in extremo codice equitandi disciplinæ synopsis."

§ If any credit is to be given to David Ganz in his edition of Vorstius, quoted by Sarmiento. *Quotidietune exhibant Korduba in Hispania Septingenti viri Israelitici qui vehabantur septingentis curribus, omnes vestiti indumento regio et redimiti tiarís Juxta legem magnatum Imaelitarum.—Memorias para la historia de la poesia y poetas Espanoles. Madrid. 1775.*

tures. The country from Cordova to Anduxar is extremely well cultivated, and beautifully varied with corn, olive and vines; as the ground is in general of a hard nature, and does not give way, the rains have no other effect than gently washing away a small part of its surface, for which reason those deep gullies, so common in Murcia and Valencia, are not seen here, where the soil is composed of different kinds of earth, alternately with rock, and easily carried off by the waters. This accounts for their having such plentiful crops in Andalusia after heavy rains, with such deep floughs; but after a drought they have scarce any harvest, and travellers are smothered with dust. They are famous about Anduxar for making those little pitchers of a white argillaceous earth that preserve water so cool in summer. In other parts of Andalusia they have earth of the same quality of a red colour, with which they make elegant drinking bowls that keep the water equally cool as the others, being light, thin, porous, and having the surface always damp: but they are not so fine and delicate as those earthen vessels from the West-Indies called *bucaros*, nor made with such neatness and art. The Spanish ladies are so fond of them, that not content with putting broken pieces thereof into their boxes to give a flavour to their snuff, they will frequently eat them with singular pleasure. Besides what is used
in

in this manner, they have boxes reserved for it solely, and their attachment to *bucaro* is so great, that the old ladies pile it up in cabinets like valuable china; in these jars and basons they occasionally put water, which diffuses a fresh earthy smell, which they are very fond of in their apartments.

L E T T E R XIV.

Observations made in a progress from Cadiz to Carthagena.

THE city of Cadiz is built on a peninsula upon rocks stretching out into the sea, composed of a great variety of matter, such as marble, spar, pebble and shells incorporated in the sand, and combined together by a glutinous substance in the sea, which seems powerful in this place, as may be observed by the rubbish thrown into it, insomuch that bricks, stone, sand, shells, &c. after a certain time become consolidated, and form one single mass.

In 1440, John king of Castile gave this city to Don Pedro Ponze de Leon, with the title of Count thereof; his grandson Don Rodrigo was afterwards made Duke of Cadiz, in 1484, by Ferdinand

B b

and

and Isabel, but thinking it a place of too much consequence after the discovery of America, they took it from him again, and made him Duke of Arcos. In queen Elizabeth's reign, it was taken by storm by the English forces under the Earl of Essex with a trifling loss, Sir John Wingfield, quarter-master general of the army, being the only Englishman of note killed in the expedition.* In old

* Sir John Wingfield was grandson of Sir Anthony Wingfield, knight of the garter, vice-chamberlain of the household, and captain of the guard to king Henry VIII. immediate ancestor to Sir Mervin Wingfield, Bart. who dying without issue male, the title became extinct, and his only daughter, Mary, married Francis Dillon, Esq; late of Proudston in the kingdom of Ireland, and was mother to John Talbot Dillon, who dedicates this note to her memory.

Sir Richard Wingfield of Kimbolton brother to Sir Anthony Wingfield above-mentioned, was appointed marshal of the town and marshes of Calais, by Henry VIII. 14th November 1511. The next year he was one of the ambassadors to treat with the pope and emperor. In 1514 he was made a banneret at the siege of Tournay, and joined with Sir Gilbert Talbot in the deputyship of Calais, was sent into Flanders ambassador to Charles prince of Spain, and appointed with the duke of Suffolk, to receive the queen dowager of France, and conduct her into England in 1521; he was one of cardinal Wolsey's retinue to meet the emperor in Flanders, was chancellor of the dutchy of Lancaster, and on the 23d of April 1522, having had the honour to be elected knight of the garter in the same scrutiny with Ferdinand afterwards emperor, he was installed the 11th of May at

old Spanish chronicles it is called *Calis*, from whence our English mariners generally call it *Cales*.

The *Solano* wind is still more prejudicial here than in Seville, and when it has blown for eight or ten days, introduces such an acrimony in the blood, and causes such a tension of the fibres, as to have the most alarming effects on the fair sex, with every displeasing symptom, like the *Scirocco* in Italy.

In the capucin's garden there is a dragon tree, supposed to be the only one in the kingdom, though it grows naturally in the Cape de Verd

B b 2 islands,

at Windsor. That year, with Sir William Sanders, knight of the garter; he led the rear of the English army sent into France; attended on the emperor into Spain, at his return from whence he was present at the burning of Morlaix. In 1525 he was sent ambassador into Spain, with Cuthbert bishop of London, and died at Toledo 22d July, where he was buried with great solemnity in the church of the friars observants of St. John, by the directions of Navera king of arms of Spain, assisted by Christopher Barker Richmond herald. He married to his first wife Catherine daughter of Richard Widville Earl Rivers, widow first of Henry Stafford Duke of Buckingham, and after of Jasper de Hatfield, Duke of Bedford, by which marriage Sir Richard became great uncle to king Henry VIIIth.

Sir Richard Wingfield, another descendant of this family, was constituted mareschal of Ireland, by queen Elizabeth, and one of the lords justices by king James the Ist, who also on the 1st of Feb. 1618, created him viscount Powerscourt of that kingdom.

islands, as well as at the island of Madeira.* Modern writers have fully described the extensive commerce, affluence, and hospitality of the citizens of Cadiz : they are badly supplied with water, and their flesh market is indifferent, but the bay affords them a variety of excellent fish, particularly dories, called here St. Peter's fish,† soals, and red mullets, with many other sorts, of an excellent flavour.‡

Port St. Mary is a large and handsome city ; on the north side of the bay, from whence it is a journey

* Professor Vandelli, of Lisbon, principal botanist to the king of Portugal has published a treatise on the dragon tree. See " Vandelli disert. de arbore Draconis Olisp. 1768."

† So called from a legendary tale of St. Peter, who when he found money in the fish's mouth to pay tribute, left the marks of his fingers upon the fish.

‡ Saurez Salazar, a prebendary of Cadiz, has published the antiquities of this city, and has given a design of the famous statue of Alexander the Great, which he saw in his time, and supposes may be the same that stood in the temple of Hercules, visited by Cæsar, which drew tears from that illustrious warrior ; but if, says our author, Cæsar was to behold it again, he would weep once more to see it in so bad a condition. This reverend prelate the more clearly to evince the spirit and vivacity of the women of Cadiz, has collected, with the gravity of a schoolman, the most obscene lines of Martial, Juvenal and Catullus, to illustrate their libidinous conduct, and this he dedicates to cardinal Don Antonio Zapata. " Grandezas y antigüedades de la Isla y Ciudad de Cadiz por Juan Bantista Salazar Racionero en la Santa Iglesia de Cadiz." En Cadiz, 1610.

ney of three leagues to the city of Xerez, remarkable for its excellent wine so well known by the name of *Sherry*. The best and richest sort is called *Pagarette*, from the Spanish word *Pago*, a district, and particularly applied to this vintage. In one *aranzado* (an acre of vineyard) they plant 1800 vines at regular distances. It is reckoned a good year if it gives three butts per acre, middling if it gives two, bad if it gives but one, but some years it yields four or five.*

Medina Sidonia is six leagues from Xerez, then the city of Arcos, seated on a cragged rock, at the foot of which runs the river Guadalete, on whose banks the unfortunate Roderic the last Gothic king of Spain lost his life and dominions; a route of ten hours through a stony country leads to the village of Algodonales lying under a high mountain, pierced through from East to West. The people here have a tradition that this place was built by the Romans who had made this perforation in search of a mine.

The

* Names of grapes : - *Pedro ximenes*, *palomino*, *cancazo*, *alvillo*, *bejarego*, *mantudo*, *penuno*, *muscadel* large and small, *calona* for eating, *feral* and *molinar* both for eating and wine, *beba*, to eat, *almunecar* for wine.

The first year the vine is called *farmiento*, a shoot; second, *grenuela*, little fruit and not good; third, *descavezados*, pruned; fourth, *wirote*, much fruit and not good wine; fifth, *majuela*, compleat vine makes good wine. The vines continue ten years in full force, and last a hundred years with proper care.

The city of Ronda is six leagues from Algodonales, on a very high situation, it being a continual ascent from Xerez, which continues as far as Gibraltar : the country about Ronda is remarkably fertile and supplies Cadiz with all kinds of fruit and vegetables, the soil is of a reddish colour with pebble and resists the heat of the fire, for which reason it is much used in furnaces for fusing iron. Amongst other curiosities with which the country of Ronda abounds, that little animal called the gennet is one of the most extraordinary, and not to be found in any other part of Europe except Turkey. It is smaller than the civet, has a long body, short legs, a sharp snout, and a slender head : under its tail there is a long bag which emits a perfume. Its fur is soft and glossy, of an ash colour marked with black spots, which unite upon the back and form stripes which run longitudinally from the neck backward, with a long tail diversified with ringlets of black and white : the fur was formerly in esteem, but of late has been counterfeited by tinging grey rabbit skins with black spots, and is now out of fashion.* The district of Ronda

also

* We read in the history of France, that Charles Martel having obtained a compleat victory over the Saracens, at the battle of Tours, in 762, found so many of their helmets, ornamented with the skins of gennets, that he instituted the order of knighthood of the Gennet, in memory of that action.

also furnishes the fierce bull, the ravenous wolf and other obnoxious animals; its rocks serve as a retreat for the eagle, the osprey and kite; yet notwithstanding such numerous enemies its soil makes ample amends by its unbounded fertility. †

About three leagues from Ronda to the south east, and four from the little ports of Estepona and Marvella, an attempt has been made some years ago to erect a manufacture of tin-plates by Don Miguel de Topete, marquis of Pilares, assisted by Benito Berbrungen, a fugitive Saxon, who brought the secret from Germany. Three hundred thousand dollars (£50,000 sterling) have been

on. The knights wore the figure of that animal pendant to a golden chain about the neck. This order supported itself till the reign of St. Lewis, when it fell into disrepute. Mr. de Buffon appears to have been misinformed in saying that the gennet could only live in low and marshy spots, when the mountains of Ronda abound with them. See "Journey from Gibraltar to Malaga, by Francis Carter, Esq;" London, 1777.

† See Natural history of Ronda in Mr. Carter's journey, who says that that the district of Ronda is so fertile that the druggists shops are supplied with medicinal herbs from thence both in Spain and the Indies. An account of these plants has been published in Spain by Don Macario Farinas, who died in 1660, under the title of "*Virtudes nuevamente descubiertas de las hierbas medicinales de la Sierra de Ronda.*"

been laid out in buildings and other accessories relating to this manufacture to very little purpose. On the road to the manufactory, there are iron mines where the ore is found in little pieces like comfits, similar to that of Befort in France. Four leagues from hence to the South East, nearer the sea, there is a famous mine of black lead, the true *molibdena*, being a perfect mine, not divided in lumps in the sand-stone, like the other mentioned before, yet even this is totally neglected. A few years ago, a foreign consul had the king's leave to extract two hundred and fifty quintals per annum, but it is presumed he got four times that quantity. Near the town of Ximena they are building a cannon foundery. They get the ore in *Sierra* at about two leagues distance, and it is said to be very good: they also find loadstones. The revenues collected at Marvella, Estepona, Manilva, &c. are applied to the expenses at Ximena, which is five or six leagues from the sea with very bad roads.

The *Sierra Vermeja* is a range of hills which run westwardly towards Malaga, and afford a singular curiosity, for though they run parallel, and so close that their bases join, yet one is red and the other is white; snow will not remain on the highest, while it constantly covers the other. The white hills produce the cork tree and *Encina* oak; the

the red has no oaks, but is covered with firs. The white has iron ore in little lumps; the red has several ores but no iron. The waters of the white hill are martial and vitriolic; those of the red sulphurous, alkaline, and with a strong smell like those of Cotterets in France. Near this place is the last village on the Carthagera side; the Granada hills are covered with the golden saxifrage, which the Spaniards call *doradilla*, and hold in repute in calculous cases.

The plains of Lorca abound with oleander, which on account of the bitterness of its leaves is named *amarga adelfa*, and serves as a constant comparison in Spanish sonnets and novels. Near Lorca there are two antient mines of lead and copper, and in the *Sierra* towards the sea near Carthagera, the village of Almazarron is famous for its fine red earth without any mixture of sand, and is a principal ingredient used in Spanish snuff, to give it that fine colour and softness to the hand, and to fix its volatility. It is sometimes called after the name of the village, but more commonly *almagre*, and is likewise used in the glass-house of St. Ildefonso instead of *tripoli*, to give the last polish to glass, as others use *colcothar of vitriol*, the caput mortuum, or residue left at the bottom of the vessel after the distillation of vitriol. Spain also furnishes *colcothar nativa rubra*, which is a red martial earth loaded with vitriol, but this is a scarce article

article in commerce. The neighbourhood of Almazarron moreover affords another singularity, and that is the white stone called plume alum, or *pseudo asbestus*, which is a matter truly saline, tasting and dissolving in water like alum, and crystalizing in form of feathers, from whence its name, being found thus in grottos, where aluminous minerals pass. The other matter to which the name of plume alum has been given, is nothing else but a friable *amiantus*, or *asbestus*. Near Almazarron the remains of a silver mine are to be seen, which in former times is reported to have yielded great quantities of silver. A plain of six leagues, with reddish soil, like the neighbouring hills, leads to Carthagená, and is so fertile in corn, in rainy seasons, that it produces sixty for one; but this seldom happens, as the country is frequently scorched up, and they suffer from droughts; however their plentiful harvest of *barilla** makes them ample amends, requiring little water, and being in great demand in England, Ireland, and France, for making crystal glass, hard soap, and for bleaching. Besides these advantages, the kingdoms of Granada and Murcia, yield together, annually, 700,000lb. weight of raw silk, which is now totally consumed in the manufactures of Spain, which must have increased to an immense degree, as formerly the exportation of raw

* *Salsola soda*. Linn. Glass wort.

raw silk was very great; whereas, of late years, upon short crops, they have sometimes been under a necessity of importing it from Italy. The famous harbour of Carthagena has been lately described by an ingenious traveller § They make cables in the arsenal of Carthagena with hemp from the kingdom of Aragon, the use of which was introduced under the direction of the late celebrated admiral Don Jorge Juan, and they imagine them to be equal in goodness to any imported from abroad. Amongst the stone at the bottom of the harbour, the fishermen bring up the *Pholades*, which a few years ago were not known there, the people not suspecting they could subsist in the centre of their rocks, without any visible aperture to get in at; at present they are searched after as a delicate morsel, and are to be found in most places on the Mediterranean coast.

Being now in the kingdom of Murcia, I should not forget the baths and waters of Archena, whose virtues are so extolled as to be thought an universal remedy for every disorder, concerning which Don Francisco Cerdan a physician of Villena, published a dissertation in 1760. A professor of poetry having found great benefit from the warm
baths,

§ Travels through Spain in 1775 and 1776, by Edward Swinburne, Esq. London 1779.

baths, has also sung their praises in a poem.* These baths were frequented by the Romans, as appears from an inscription on a very hard stone, almost black, and roughly cut, found in the men's bath in 1757, which is now fixed as a resting place at the door of a principal house near the river; the inscription is as follows.

C. CORNELIVS CAPITO. L. HEIVS LABEO
II. VIR AQVAS. EX D. D. REFICIENDAS
CVRARVNT. IQ. P.

THAT IS

*Caius Cornelius Capito, Lucius Heius Labeo
Duumviri aquas ex Decreto Decurionum reficiendas
curarunt iidemque posuerunt.*

LETTER

* See *Thermæ Archenicæ*, por Don Ignacio Ayala, professor de poesia en San Isidro en Madrid. Impreso en Murcia en latin y Espanol, 8vo, 1757.

The other hot baths of Spain are Ledesma in Castile, Trillo, Hardales in Andalusia, Alhama in Granada, Villavieja, Buzot, Sacedon, Grená, Fortuna, Azaraque, Mula, and others of less note.

L E T T E R XV.

The face of the country described between Carthagena and Alicant.

IN going from Carthagena to Alicant, you cross the rich veil of Murcia, covered with mulberry trees, and pass through a delightful country to Orihuela and Elche,* remarkable for its numerous groves of palm trees, the branches of which are a lucrative article of trade. The fertility of this country, particularly round Orihuela, exceeds all description, their harvests of wheat are very great, and they are reckoned to have the best bread in Spain. At Orihuela they make those curious snuff-boxes with the roots of the terebinthus, called *cornicabra* in Spanish, which are so much admired on account of their beautiful shades, representing landscapes, &c. they are chiefly useful for Spanish snuff, as they preserve it moist and cool, and for this purpose are in great estimation at Rome. As a further proof of the great abundance and
plenty

* The antiquities of Elche have been lately illustrated by Don Antonio Mayans, canon of Valencia, brother to Don Gregorio Mayans y Siscar, the celebrated writer. See "Ilici hoi la villa de Elche ilustrada con varios discursos, por Don Juan Antonio Mayans y Siscar." Valencia, 1771.

plenty at Orihuela, it is said that the tythes of *Pimenton* and *Tomates*, "guinea pepper and love apple," paid to the bishop of Orihuela, amount to £ 1600. sterling per annum.

The castle of Alicant stands on a limy rock above a thousand feet high, having shells half petrified on its summit. The plants of the vallies grow also on its top, the seeds of which were probably dropped by birds, or brought by the winds. The eastern side of the hill contains red wavy flint, with pieces of agate fixed in the rock, and on the west side there is plume alume in the crevices of the rock, and lower down beds of *tripoli*, which is used by the silversmiths in these parts. Going from the city towards the north-west about half a league distance, the fields are full of those stones called *numulariæ*, and by the people of the country *moneda de las bruxas*, "witches coin." Likewise *lenticulares*, some of which are as small as a pin's head. This country also produces the *scinus molle*, or Peru pepper, whose fruit grows in bunches of a handsome rose colour.*

The

* In Gerard's herbal mention is made of a tree called *molle* or balsam tree, "This tree, says a learned physician, Johan Fragofas, grows in the king of Spain's garden at Madrid, which was the first he had ever seen; since which time Juan Ferdinando, secretary to the king, did shew unto the

The *buerta de Alicante* is a beautiful plantation, about one league long and two broad, full of vineyards, which they are sometimes obliged to water; the grape nevertheless affords that excellent wine so well known, to which must be added an amazing quantity of mulberry trees, almond trees, fig, and *algarobas*, or carob trees, the *ceratonia edulis* of Linnæus, which requiring little moisture, succeeds in dry soils, and thrives equally in every situation, whether on hills or in plains.*

The city of Alicant forms a crescent, on the sea side, and is well known for the luxuriancy of its
environs,

the said Fragofas in his own garden, a tree so large and of such beauty, that he was never satisfied with looking at it, and meditating on the virtues thereof." See Gerard's herbal, and Lobel's description of it.

* The fruit grows in a hulk like a bean cod, inclosing four or five beans, and is given to cattle shell and all. It is sweet and palatable, and often eaten by poor people: it is a tall slightly tree, and in a manner peculiar to the kingdom of Valencia. The pods are green on the tree, but grow brown when dry. According to Miller, they are apt to loosen the belly, and cause gripings of the bowels. He says, these pods are directed by the college of physicians to enter some medicinal preparations, for which purpose they are often brought from abroad. The tree is preserved as a curiosity in England among other exotics, as the leaves always continue green, and being different in shape from most other plants, afford an agreeable variety, intermixed with oranges, myrtles, &c. in the green-house.

environs, as well as its extensive and lucrative commerce. That part of the shore nearest the city forms a bed of limestone mixed with sand, in which the triple-hinged oyster shells are found, with *buccinæ*, *moleæ*, *tellinæ*, and *urfini*, half petrified, the shells often preserving part of their natural varnish, and the oyster shells their scales, by which the commencement of their petrification may be perceived. In that part of the beach next the sea, the sand is the same as in the neighbouring rocks, washed from the limy earth, which the water has dissolved, leaving only the *pilla marina* formed by the fibres of the roots of the *alga*, or sea moss.

A chain of hills are discernable at Alicant, extending from Murcia, forming a semi-circle of two leagues extent from the city, and close in with the sea about four leagues from each other, shutting in a fine vale, and inclosing the part we have spoken of before, which it shelters from the north winds, and enables it to partake more effectually of every benign influence of the south. The western side is uneven, full of stone, and consists of a white calcareous soil, whose surface is covered with large shells more perfectly petrified than those on the sea shore, particularly two sorts of *urfini*, the large and small, the former of the size of an orange, found still larger in the interior parts of Valencia, of a distinct species, and so perfectly petrified as to receive

receive a polish like marble, being different from those generally seen in cabinets of natural history. The oyster shells between Murcia and Mula are also distinct from those of Alicant, having only one hinge, are about eight inches long and five broad; which opens a field of speculation for naturalists, with respect to these various petrifications and their period of antiquity.

Two leagues to the south west of Alicant, there is an insulated calcareous mountain, at the eastern foot of which they find small crystals, red, yellow and white, with two points like diamonds as regularly cut as if done by a lapidary. The red and yellow are hyacinths. A spring called *Fuente Caliente* issues from that side of the mountain, and waters the lands belonging to the house of the late admiral Don Jorge Juan,* so well known to the

C c

learned

* Don Jorge Juan died in 1773, and is buried in the church of St. Martin, in Madrid, where a monument is erected to his memory, with his bust in profile, by Philip de Castro, and the following inscription.

Ex D. D. Georgius Juan & Santacilia Noveldae apud Valentinos natus, melitenfis ordinis Eques, Bellicae classis agmini Praefectus, nobilis scholae nauticae cohortis Dux et Regii matritensis seminarii moderator : Domito novae structurae navibus mari, lustrata Legatione ad Marochium Africa, peragrata ad telluris figuram asserendam America, literariis laboribus Europa ejusque academiis, Hispana Divi Ferdinandi,

learned world, who was born at Novelda, in this neighbourhood.

On doubling the first point of land to the eastward of Alicant, the bay and harbour of St. Paul presents itself, with a view of the antient castle of the duke of Arcos. Here the ships come to an anchor

nandi, Gallica, Anglica, et Borusa illustratis, quam a Deo acceperat vitam, pietatem optimisque moribus excultam, post annos LX. Deo reddidit Matrili Kal Jul. A. M. MDCCLXXIII. carissimo fratri Bernardus et Margarita moerentes annuente III. D. D. Joannae Zapata, Marchione S. Michaelis de Gros corpus hic condi et monumentum poni curarunt.

Don Jorge Juan published the following works.

Compendio de la navegacion para el uso de los Caballeros Guardias Marinas. Cadiz, 1757.

Examen maritimo Teorico Pratico ; o Tratado de Mecanica aplicada a la Construcccion conocimiento y Manejo de los navios, &c. Madrid, 1771.

Relacion historica del a la Viage America meridional y observaciones astronomicas y Physicas en el reyno de Peru por Don Jorge Juan y Don Antonio de Ulloa, 5 tomos, 4to. Madrid, 1748. The historical part of this work was written by Don Antonio de Ulloa, now an admiral in the Spanish fleet, and has been translated into English, of which there has been a third and improved edition. See "A voyage to South America, describing at large the Spanish towns, provinces, &c. on that extensive continent, undertaken by command of the king of Spain, by Don Geo. Juan and Don Ant. de Ulloa, F. R. S. &c. with copper plates, and a preface by Dr. Campbell, 2 vols. 8vo."

anchor and load salt from the *Mata*, a great lake by the sea side, but without any visible communication with it. The quantity of salt collected here is immense, and is the property of the king, costing little more than the labour of heaping it, being in a manner produced naturally. The high bank which separates the sea from the *Mata* appears natural; the lake is bounded on the land side by mountains, and is formed by the torrents of rain water that gush down in winter, which evaporating gradually by the heat of the sun, added to the nature of the soil, become a mass of salt, so plentiful that some years the exports have amounted to near one hundred thousand tun weight, chiefly for Holland and the Baltic; considerable quantities also are in demand for curing of fish, particularly for Newfoundland and New England. The cost is about eleven shillings sterling per tun, on board; and the king, in order to encourage the export, lets the price always remain the same.* The soil and air in general, on the coasts of Valencia, Murcia, and Granada, is impregnated to a very uncommon degree with salt, and considerable salt-petre

C c 2

works

* The island of Ivica also produces immense quantities of salt with as little trouble and expense as that of the *Mata*, and they have a considerable exportation, much on the same footing, it being equally the property of the king. This is salt also sold for home consumption, at a price equal to about four shillings sterling per cwt. English.

works are carried on in many ports, particularly at Murcia and Lorca, collected from the earth in the fields, the very dust on the roads and in the streets; from which, after extracting the quantity of salt-petre, the same dirt, thrown up in large heaps, serves again in four or five years, for the like purpose, and furnishes a fresh supply. This circumstance renders the soil so peculiarly favourable for the culture of *barrilla*. There are eight or ten different sorts of plants in the plains of Alicante, whose ashes serve for making glass and soap; but the *barrilla** is the principal and best sort: the method of making it is well described in Miller's gardener's dictionary, and is much the same as is used in the North of England in burning kelp. An acre may give about a tun.

I close this letter with the further observations made here by Don Guillermo Bowles, relating to a cinnabar mine, which I shall give in his own words, as they relate to particular researches of his own: "About two leagues from Alicante there is a mountain called *Alcoral*, composed of lime-stone. On digging in that part next the valley, I discovered

* The four principal plants for the purposes abovementioned are distinguished by the names of *barrilla*, *gazu*, *sofa*, and *salicor*, and are difficult to be distinguished except by good judges. They have been fully described by Mr. Swinburne.

ed a bed of mineralized mercury with sulphur and calcareous earth, of the shape and colour of cinnabar ; however as this bed disappeared at a hundred feet depth, I suspended my pursuits. I found thirteen ounces of heavy sand, of a beautiful red colour, in a crevice of rock ; I essayed one ounce, and found it to contain more than eleven ounces of quicksilver per pound ; it perfectly resembles the sea sand in its hardness and angular form. The colour becomes livelier when pounded, which shews that every grain was possessed of sulphur and mercurial vapour, in the same manner as the sand is with iron at Cape de Gat.

On the top of this mountain, and not far from a bed of red gypsum, I found different marine bodies petrified, such as *telenites* and pieces of *madrepores* mineralized with iron as well as other petrifications : and about fifteen feet under ground I discovered pieces of mineralized amber, fixed in the rock, being of the same sort as those on which the late Don Joseph Sunal, the king's physician, published a treatise. There is of this amber in Asturias, near Oviedo, but not so beautiful as the specimen shewn to me by that physician. I also found, in the same place, a lump of rock bigger than my fist, having a petrified shell, and a piece of dark amber, like colophony, with a vein of cinnabar, like a thread, running between. On considering the nature of these materials, that is, the
gypsum,

gypsum, the petrifications, and the cinnabar, I am of opinion this last is of a later date †."

Close to the Port of St. Paul there are ruins of a Roman edifice, and a few years ago a brick oven was discovered, containing several coins of Augustus, about a musket shot from the sea, which confirms the little it has retreated on this side.

L E T T E R XVI.

Road from Alicant to the city of Valencia.

THE beautiful objects which crowd in upon the eye of a traveller, as he moves towards Valencia, are such, and the hand of nature has been every where so profuse, that a writer must be possessed of uncommon abilities to do justice to so animated a picture, or describe in its proper colours so enchanting a vale, enriched with every valuable production. In going from the city of Alicant towards this fertile kingdom, the first observation that occurs is at the pleasant village of Ibi, where there are numerous plantations of the garden almond, grafted on the wild tree, which

† Don Guillermo Bowles. Page 34.

from the mildness of the air produce the best almonds in Spain, and will keep very well for eight or ten years, when the others soon grow considerably rancid. The neighbouring hills are covered with the kermes oak and the common mastic tree, or *lentiscus* †, the savin, restharrow, rosemary-leaved cistus, and great quantities of rosemary, which contributes so much to the excellence of the honey, that it is sent even to Rome.

Between Ibi and Biar the mountains are of a calcareous nature, though half way up, they contain flint, which is in request for muskets.

Striking

† Mr. Bowles says, he knew an apothecary at Alicant, who used to boil the leaves of the *Lentiscus*, and collecting the scum which was left to dry, fold it for male incense, which he imagined to be the same as the *olibanum* or frankincense, imported from the Levant. The Spanish *Lentiscus*, however, is different from the true mastic-tree of the Levant, and from which the mastic is gathered, which is well explained by Mr. Miller in his dictionary, who complains of these trees having been confounded by most botanic writers, and that even Mr. Tournefort, who was on the spot where the mastic is collected, had not distinguished the species. The Spaniards still follow the old custom of making tooth-picks with the *Lentiscus*, the same as the Romans did, of whom Martial says,

Lentiscum melius, sed si tibi frondea cuspis
Defuerit, dentem penna levare potest.

Striking off to the southward towards Villena, several strata of alabaster are seen on the road closed in beds of limestone. There is a mine of ocre in these rocks, and they frequently find iron. Near Villena a lake of two leagues circumference furnishes the neighbouring villages with salt, and two leagues further, an insulated hill consists entirely of sal gem, covered with a gypseous coat of different colours. After passing Villena, a pleasant and well cultivated vale extends to Caudete and *Fuente La Higuera*, at the foot of a high mountain covered with mithridate. Two fine springs issue from the hill of *La Higuera*, and form the brook of Rambla, whose sides have strata of red and white earth, which shew themselves and disappear alternately in proportion as the waters force their way deeper. Following this brook for four hours you come to Mogente, and in three more to Montesa, opposite to which a towering mountain terminates in a pointed rock, on which stood the convent belonging to the military knights of the order of Montesa. On the 23d of March, 1748, a dreadful earthquake overturned this rock, demolished the convent, and buried its inhabitants under its ruins. An unfortunate man in endeavouring to make his escape through a crevice of the rock, it suddenly closed and crushed him in so terrible a manner that when the body was afterwards

wards found, there were hardly any remains seen of the skull or bones. It is remarkable that in a chain of hills opposite to Montesa, there is a steep hill with an old moorish castle on the summit, which never has suffered from earthquakes, though frequent in Valencia, owing perhaps to its very perpendicular position, being one solid and compact mass, having its root, as it were, deeply fixed under ground, whereas the mountain of Montesa consisted of various strata of stone in a horizontal direction, not sufficiently combined to resist such a violent impulse.

Near San Felipe the country gradually opens in a most rural and fanciful manner ; while the eye is struck with new objects ; an old ruined castle and shattered fortifications, on the summit of the hill recall to one's mind all the horrors of war and devastation, which are soon effaced by a cheerful valley worthy the pencil of a Claude or Poussin ; you insensibly find yourself encircled with mulberry trees, which gives to the whole country the appearance of a pleasure ground, where a rich cinereous soil yields three crops a year, owing to excellent culture, as well as its natural quality, besides the advantage of water at pleasure at six feet depth, independent of the surface being amply supplied by the river Xucar.

Three

Three leagues to the eastward of San Felipe, there is a high mountain entirely of marble of three species, without any fissure, white, red, and yellow, which all admit of a very good polish, and the fields are covered with plantations of rice far superior to that of the Levant, though yellower, but will keep much longer without acquiring any acrimony *.

I come now to speak of the plain of Valencia, but where shall I find words expressive of its beauties,

* Mr. Swinburne having given so accurate an account of the culture of rice on this spot, I cannot offer a more exact description thereof than related by him; which corresponds with Mr. Bowles's information: "In winter they plough out a piece of land, and sow it with beans that come into blossom about March, when they plough them in for manure; water is then let in upon the ground, about four inches deep. It next undergoes a third ploughing, after which the rice is sown; in fifteen days it comes up about five inches out of the earth, and is pulled up, tied in bundles about a foot diameter, and carried to another well prepared field, covered with water to the depth of four inches. Here each planter sets the plants of his bundle in the mud in rows at about a foot distance one from another. Every stem ought to produce from ten to twenty-four fold and grow so close that the ears may touch. When ripe it is gathered in sheaves, and put into a water-mill, where the lower grinding-stone is covered with cork; by which means the chaff is separated from the grain without bruising."

beauties, such as none can conceive who have not been on the spot, and beheld this lively scene of natural magnificence. This plain is composed of two strata of clay, having a sandy soil or pure sand between them. On removing the first stratum, which may be from fifteen to twenty feet deep, they infallibly find water running between these two beds; the clay not suffering it to filter through: whenever the upper stratum is wanting it of course overflows that part of the country. This accounts for so many lakes in those plains, and for that considerable one called *Albufera de Valencia*, which is no more than an extended portion of such a situation, where the upper stratum has failed, and occasioned that great lake of fresh water, four or five leagues in circumference, receiving also the waters of the river Xucar, and many springs and brooks without any visible increase, because its surface is so extensive that it loses by evaporation as much as it receives, and thus always preserves an equal depth of about two or three feet.

This lake supplies the markets of Valencia with fish, particularly eels; at certain seasons of the year it is greatly resorted to by sportsmen, and covered with boats, as numbers of aquatic fowls delight in this place, and sometimes they see the
flamengo §;

flamengo §; but neither the excrements of so many birds, nor the putrefaction of so many dead fish, afford the least symptom of volatile alkali when analyzed, no more than the water of the sea, notwithstanding the numbers of fish that die in it. The bottom of the *Albufera* is a bed of pure clay, and if by any accident the waters should run off, we should find it without any mixture of stone, sand, or iron, and perfectly similar to the fuller's earth of England.

Amongst the beautiful spots in this country, none exceed or can be compared to a district in

§ This singular bird is so called on account of the red or flame-colour of its wings, and feet; it is a scarce bird in Europe, and always frequents lakes. They have a tongue not much less than a kid's tongue, and which was reckoned a delicious morsel by the voluptuous Romans. When Mr. Peiresc received his friend Le Vayer at his house, he entertained him with this dish, repeating those lines of Martial,

Dat mihi penna rubens nomen sed lingua gulosis
Nostra sapit.

Le Vayer wondered why Apicius and the emperors Caligula, Vitellius, and Heliogabalus, had reckoned it so dainty a dish, for instead of being exquisite, he found it rather unpleasant, with a fleshy taste, like that of all water fowl. Therefore the inhabitants of Province generally throw away the flesh, and only make use of the feathers as an ornament to other birds at particular entertainments. See "Life of Peiresc, br Gassendi. Translated into English by William Rand, M. D." London, 1657.

in this neighbourhood, called the *Huerta de Gandia*, yet this enchanting place so near to the city of Valencia, is little known to travellers, as it lies on the sea coast out of their track, at a small distance from the road, hemmed in by a circular chain of hills, forming an inclosure of about a league and a half diameter. Near the sea the city of Gandia, capital of the dutchy of that name, offers a new point of view, and from the church steeple, you have a noble prospect of the *Huerta*, and may see above twenty villages dispersed amidst an infinite variety of verdure and foliage, enriched by a diversity of fruits. Amongst the rest, the blue fig, the glowing pomegranate, and the verdant olive vie with each other in excellence; even the very beach seems desirous of adding a share to this plentiful store, for the prickly pear shoots out every where amongst the cliffs of the rocks, and its fruit is free for all who choose to partake of it. In this seat of bliss, simplicity and perfection fill the mind with delight, and all the laboured powers of invention are outdone; for nature here, as Milton says,

Wantons as in her prime, and plays at will
Her virgin fancies, pouring forth more sweet,
Wild above rule or art.

LETTER

L E T T E R XVII.

Observations made in the city of Valencia and its environs.

FAIR Valencia! how shall I describe thy transcendant beauties, or speak of those infinite glories that adorn thee? If celebrated architects have not graced thy capital city with sumptuous palaces, or given a more pleasing form to thy streets, be contented that the great Architect of the universe has poured on thee blessings innumerable to render thy happiness compleat, and make thee the admiration of the world, inspiring at the same time thy sons with the most exalted talents to sing perpetually thy praise!*

The city of Valencia is happily situated about three miles from the sea on the West side of the river Guadalaviar, with five stone bridges over it, which afford a variety of agreeable outlets from this

* An account of the writers of the kingdom of Valencia only, makes a work of two volumes in folio. See "Escritores del reino de Valencia, chronologicamente ordenados desde el año 1238 de la Christiana conquista de la misma Ciudad hasta, el de 1748 por Vicente Ximeno Prefbitero, &c. Valencia, 1749. 2 tomos en folio.

this pleasant city, exultingly rising out of a forest of mulberry trees, which bring an immense wealth to its citizens. The branches of these trees are made to grow horizontally, in order to pick the leaves more easily, and the trees are pruned every two or three years, to preserve the leaves soft and tender, that the silk may be finer, cleaner and lighter than that of Murcia, where the trees are only pruned once in four years, which renders the leaf woolly and tough. In Granada they do not prune them at all, and yet suppose their silk is the finest in Spain; but their trees are of the black sort, and those of Valencia and Murcia are of the white mulberry, for which reason the worms of these two last provinces when carried to Galicia, where they have none of the white sort, never succeed, while the worms of Granada thrive admirably well, in meeting with a similar leaf to that of their own country.

I shall not enter into a detail of the manifold branches of cultivation in the environs of Valencia, where nature always smiles, and where the very air is constantly embalmed with the fragrant perfumes of an infinite number of fruit trees and odoriferous herbs. The cedrats are so large as sometimes to weigh more than six pounds, when the tree that produced them is not above two or three feet in height: as to flowers and plants, their beauty and variety are wonderful,

as

as well as the amazing quantities of pomegranates, figs, cherries, pears, and grapes the most delicious imaginable, with bunches fourteen pound weight, and every grape as large as a nutmeg. To heighten still more this boundless fertility, the intermediate spaces between the trees are filled with melons, artichoaks, cauliflowers, and almost every species of pulse supplied with constant and copious streams of water, which in a kingdom blessed with an eternal spring, and where the grim frost is unknown, seems to unite every idea of the golden age of the poets.

The grapes of Valencia and Granada have the preference to all others in Spain. They cannot, it is true, from their distance, be sent fresh to England like those of Portugal, but they ship off large quantities of raisins at Malaga. They prepare them in Valencia with the lixivium of seeds whose salt augments the heat of the water in boiling. The grape is dipped for a moment in this lixivium, when the skin bursts on every side, and the juice gushing out candies in the air, after which the bunches are hung to dry in the sun. The cold weather afterwards perfects this crystallization, so that when they get to England, they become so many cakes of sugar, infinitely better than when first shipped off. The raisins *of the sun*, as they are called, are still more delicate, having the stalk half cut through, while the bunch remains suspended

pended on the vine, and partakes of the heat of the sun, as the sap cannot penetrate after they are dried; they are packed up in boxes. This is the method used in Granada, which makes them more luscious and delicate, and justly gives the preference to the Malaga raisins.

As the river Guadalaviar empties itself into the sea, about three miles below Valencia, it is said a plan has been proposed to deepen the channel of the river, which would be of great advantage to its commerce, as the ships lie in an open road in a dangerous situation. Much might still be done to enliven and give activity to this agreeable city, formerly known to the British army, having opened its gates in 1705 to the earl of Peterborough, but after the defeat at Almanza, the duke of Orleans at the head of the Spanish forces recovered it again.

There is a pleasant village about two leagues from Valencia, consisting of four streets inhabited chiefly by potters, who make a pretty earthenware of a copper colour with gilding, that serves the country people both for ornament and use, it is made of an argillaceous earth, very similar in quality and colour to that of Valencia, in which virgin mercury is found: this earthenware is very glossy, and remarkably cheap, but is far from being the best ware in Valencia; another manufacture has been lately set up at *Al-*

D d

cora,

cora, by the count de Aranda, a grandee of Spain, which for the fineness of the clay might vie with other manufactures of the kind, were its varnish less liable to crack and scale off. †

The famous marble quarry of *Naquera* is three leagues from Valencia; the village is on an eminence, and the quarry is on one side near the surface in beds of a few inches, formed seemingly by the waters. The marble is of a dark red ground, with black capillary veins like a *mocha*, which have a very good effect. Though the beds do not sink deep, it is hard enough to make solid tables, which take an excellent polish, and are greatly valued in Spain. Two leagues to the eastward of the city there is a quarry of alabaster, at a place called *Ninerola*, of which substance many curious pieces of workmanship may be seen in the house of the marquis of Dos Aguas in the city of Valencia. Two leagues from the city, on the banks of the river, the ruins of the antient city are discovered; near them they find monstrous petrifications of oyster shells, like those of Murcia, mixed with rounded sand stone; but nothing of one or the other is found in the river.

It is an agreeable tour of five leagues from Valencia to Morviedro, famous for the remains of the

† It goes by the name of Count Aranda's ware, and is sold at Madrid.

the antient *Saguntum* and its Roman theatre, described by dean Marti * as well as by such English travellers as have passed that way. The plants on the hill of Morviedro and its neighbourhood, are prickly pears, henbane, stinking orache, mithridate, capers, marshmallow and thyme. The view from the top of the hill is most beautiful, with an extensive prospect of the vale and city of Valencia and the Mediterranean. At a few leagues distance from hence to the South East, beyond a chain of hills, consisting of red marble and lime rock, the Carthusian Monks have a convent situated in a perfect paradise, where they make excellent wine. The gullies and fields are filled with pudding-stone of different sizes, firmly conglutinated together; their church is built with a stone of this kind, veined with white spar; but who will inform us whether this spar existed before or after the conglutination of the stone with its natural bitumen? The stone is undoubtedly of use to the vine, preserving to its root in the night, the genial heat of the day, while it shades it at noon from the scorching rays of the sun. There are two copper mines near this convent.

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To

* The best edition of Dean Marti's letters "*Aloisi Martini epistolæ*," with a plate of *Saguntum*, in 4to, was printed in Holland from an edition 2 vol. in 12mo, and the like another volume by Mayans, printed at Madrid by Sir Benjamin Keene. This edition is now scarce and dear in Spain, and the Dutch edition is better.

To return to the plains of Valencia, it would be an endless theme to enlarge upon its products; they cultivate great quantities of medick or lucern (*trifolium Hispanicum*) which is acceptable to horses, and makes excellent hay. The Spaniards call it *alfalfa*. Its roots make little brushes for the teeth, they are sought after by dentists. The *chirimoya*, a very fine fruit from South America, thrives and bears fruit in Valencia; in a word, every production of nature may be said to prosper in this kingdom †, for here we find corn, wine, oil, honey, flax, sugar, cotton, rice, silk,

† The following sketch exhibits the value of the principal products of Valencia.

Silk crop annually about 1.500.000 lb.	
of 12 ounces, which sells on the spot, at a price equal to 10 s.	} £. 750.000 sterling.
400.000 lb. wt. English, or 20.000 ton	
of rice for home consumption, at 15 s. per pound.	} 300.000
150.000 lb. Barilla, - -	
80 000 Raisins, - -	} for export.
10.000 Kernels of almonds	
10.000 Pipes of brandy	
10.000 Wine - - -	
	at 10 s. - - 75.000
	7 s. 6d. - 30.000
	40 s. - 20.000
	10 l. - 100.000
	4 l. - 40.000

£. 1.315.000 sterl.

Besides great quantities of wool, aniseeds, cummin seeds, and many other smaller articles, and a large quantity of oil

silk, besides fruits, and plants, producing all together near ten millions of dollars per annum. Few cities enjoy a more temperate air, or have more beautiful environs. The *Alameda*, or public walk, is one of the most pleasing in Spain; if we add to the variety of its beautiful trees, the gaudy equipages and numerous concourse of people that resort there, it forms so picturesque a scene enlivened by the fields, with a view of the city and bridges, as seems to surpass the utmost power of description; and were public spirit equal to its natural blessings, would nearly resemble the marvellous scenes of romance! Such is the beautiful Valencia, like the garden of Paradise in Milton:

A happy rural seat of various view;
Groves whose rich trees wept odorous gums and balm,
Others whose fruit burnish'd with golden rind
Hung amiable! Hesperian fables true,
If true, here only, and of delicious taste.

LETTER

oil for home consumption. Nothing is mentioned in this account, of cotton, which is a considerable article. I shall now state the whole, as given us by Mr. Swinburne, and reduce it into English money, as it makes the annual revenue much more considerable.

Silk crop of 1775, one million of pounds at 4 dollars per pound (though a good deal of it sells for 3 dollars.)	}	4.000.000 dollars.
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Fruit

L E T T E R XVIII.

Journey from Barcelona to the mountain of Montserrat.

THE city of Barcelona is generally reckoned one of the most agreeable places in Spain. Its pleasant situation, its commerce, with the activity and industry of its inhabitants, contribute to make it a place of splendor and affluence†. In this city the traveller will find a curious cabinet of

Fruit of different kinds	- - -	2.000.000
Hemp at 3 dollars per arrove	- - -	300.000
Rice at 10 dollars per load	- - -	1.400.000
Cotton 450.000 arroves	- - -	1.350.000
Vintage of 1767 wine, at 3 reals per measure		861.135

9.911.133 dollars.

Which sum of 9.911.933 dollars. at 40 d. sterling per dollar, is £1.655.855. 10 s. sterling.

* The English merchants seem to have settled later at Barcelona than in other commercial towns in Spain. Mr. James Howel, in a letter from Barcelona, dated 24th Nov. 1620, to Sir James Crofts, says, "In this place there lives neither English merchant nor factor, which I wonder at, considering it is a maritime town, and one of the greatest in Spain, her chiefest arsenal for gallies; but I believe the

of natural history belonging to a private citizen, Mr. Salvador, an eminent apothecary, who shews his collection to strangers with the utmost urbanity.

The celebrated mountain of Montserrat, nine leagues from Barcelona, has of late been so fully described by British travellers, a fine print having been lately exhibited of it *, that the subject is become exhausted, and words seem feeble to describe this awful mountain, raising its exalted crest towards the skies, with all the powers and majesty of nature; yet as it makes so capital a figure in the geography of Spain, we shall once more ascend its jagged rock, and explore its wonderful form.

The first stage from Barcelona leads to the town of Martorel, at the conflux of the rivers Noya and Lobregat; here you are sensibly struck with the tremendous appearance of this grand and solemn mountain, impressing on the mind the most exalted ideas, in viewing this wonderful effort of nature.

the reason is, that there is no commodious port for ships of any burthen but a large bay." The new mole however has rendered this port more convenient, and immortalized the memory of the late marquis de la Mina, captain general of the principality, under whose orders it was erected.

* In Mr. Thicknes's travels into Spain.

nature. You seem quite close to it, but have still three hours in the usual method of travelling in Spain to approach its basis, and as many more after to climb up to its summit. There is a famous bridge over the Lobregat at Martorel, with an arch at its foot; it has been lately repaired, as appears by the following modern inscription placed on it.

POR LOS ANOS DE 533 DE LA FONDACION DE ROMA FUE CONSTRUIDO ESTE ADMIRABLE PUENTE POR EL GRANDE ANIBAL CAPITAN CARTAGINES Y HIZO EREGIR EL ARCO TRIUMFAL QUE AUN EXISTE A SU SALIDA EN HONOR DE SU PADRE AMILCAR. DESPUES DE 1985 ANOS DE DURACION SE HALLAVA ESTA FABRICA MUY MALTRATADA Y EN ESTADO DE ARRUINARSE ENTERAMENTE PERO AFIN DE CONSERVAR UN MONUMENTO DE TAN RARA ANTIGUEDAD LO MANDO REESTABLECER EN ESTE AÑO DE MIL SIETE CIENTOS Y SESENTA OCHO, LA Magestad DEL SENOR DON CARLOS REY DE ESPANA A SOLICITUD DEL EXMO SENOR DON IUAN MARTIN DE ZERMENO COMANDANTE GENERAL DEL CUERPO DE INGENIEROS, &c. &c.

In

IN ENGLISH.

This admirable bridge was erected in the year 533 of the building of Rome, by the great Hannibal, a Carthaginian captain, and he raised the triumphal arch which still exists at its foot, in honour of his father Hamilcar. This fabric, after having stood 1985 years, was greatly damaged and in a ruinous state, but his Majesty Don Carlos King of Spain, in order to preserve so rare a monument of antiquity, ordered it to be repaired in the year 1768, at the entreaty of his excellency Don John Martin de Zermeno, commandant general of engineers, &c. &c.

Martorel is a large town, replete with industrious inhabitants, all employed and constantly at work; the women in making black lace, and the men in various useful and laborious occupations; a little further on, at the village of Espalanguera there is a manufactory of cloth, which maintains numbers of families; the same spirit of labour and application is universal every where in Catalonia; but we now draw near to the lofty mountain of Montserrat, the most singular perhaps in the world for its appearance, composition, and productions; as much the admiration of the naturalist, as revered by the natives in general, from the renown of its sanctuary, famous for miracles and the extraordinary favours granted by our lady of Montserrat to its numerous votaries.

This

The whole extent of this mountain may be about eight leagues in circumference, its chief materials consisting of round limestone, firmly conglutinated with a yellow calcareous earth and sand, not unlike the *Brecchia* or pudding-stone of Aleppo, only that the grain is coarser and the stones larger than that of the Levant, with a further addition of round white quartz streaked with red, as well as touchstone, all firmly cemented together, forming one perfect solid mass; and according as the natural bitumen which united all these together, has occasionally given way in the course of fleeting years, various torrents of rain water have rolled down and washed away the earth, the result of their decomposition, and have split the mountain into an infinite variety of shapes and singular appearances, forming in some places the most amazing clefts and frightful precipices: in others huge pieces of blanchèd and bare rock shoot up into sharp cones, pillars, and jagged forms, from twenty to a hundred feet high, exhibiting wonderful aspects that strike the eye with surprize and the mind with astonishment! its wildness increasing in proportion as you advance higher, insomuch that on reaching the summit of this enormous pile, human reason is lost in conjecture; but the sight is gratified with the most splendid prospect, looking down on an extensive kingdom beneath you as on a map, exhibiting a fertile country

try to the South, studded with villages and watered with rivers; the eye stretching out further over the Mediterranean, the landscape is rendered still more striking from the contrast on the North and East, bounded by the bare and dark mountains of the Roussillon, and the snowy tops of the Pyrenees. On these inhospitable cliffs of Montserrat, amidst the constant inclemency of jarring elements, dwells the pale hermit, with hairy gown, wrapt up in silent contemplation. Here he has hewn a solitary dwelling and offers up his fervent prayer, and takes his lonely walk, lifting up his eyes, musing

Of every star that heav'n doth shew,
And every herb that sips the dew.

But though the elements have wreaked their fury upon these elevated peaks, the indulgent hand of nature has not been sparing in her gifts to this surprising mountain, as numberless evergreens and deciduous plants serve to adorn the various gaps and breaks which its singular shape admits of, rendering it a curious repository of the vegetative kingdom. The lower part of the mountain has decomposed much sooner than the upper parts and turned into soil, productive of corn, vineyard olive, while the shelving rocks facilitate a passage to the summit, and exhibit to the botanist a view of above two hundred sorts of trees, shrubs,
and

and plants, that shoot up spontaneously, gracing this hoary and venerable pile; amongst others the scarlet oak, three different kinds of juniper, bastard alaternus, mock privet, the lote or nettle tree, the scorpion fena, the perennial strawberry tree, rosemary, gorze, thyme, fern, and towards the top the stinking trefoil of the sea shore of Valencia, and the rough bind weed of Andalusia and Biscay, proving that these plants grow equally in cold and warm climates.

Here we find the touchstone, or *lapis lydius*, known to Theophrastus the disciple of Aristotle, who says it was found in the river Tmolus in Lydia, and that the upper part was better for essaying gold than the lower, adding, that these stones appeared to be pebbles, and as they were not round, it was inferred they were fixed in the earth, and were never washed away by the rivers. The moderns make use of acids with greater advantage for the essaying of gold, by comparing a line drawn on the stone with gold of a known standard, to another line which they want to essay, for as aqua fortis has the property of dissolving all metals except gold, the colour and diminution of the lines compared together, will shew what alloy they have, with little danger of error. From hence it is plain the touchstone is not limy, otherwise it would dissolve in the acid, and the only quality required is to receive the line drawn
on

on it, and not dissolve in aqua fortis, nor is its colour of consequence, though the blacker is preferable, as shewing the gold better. This is the colour of that found in the Tmolus, the Basaltes or crystalized rocks, in many parts of Saxony, in the mountain of Usson in Auvergne, the Giants Causeway in Ireland, and these of Montserrat. They are all indissoluble in acids, and of a different nature from marble, which being limy would not answer the purpose, as the aqua fortis would carry away the stone jointly with the metal it dissolved; thus true touchstone being of a very hard nature, all vapour and moisture condense on its surface; it must therefore be carefully rubbed and wiped dry before it is used, that the adhesion of gold may be perfect. Theophrastus, though a great man, reasoned according to the philosophy of his age, which made him imagine that marble would sweat, when the dampness proceeded from the smooth texture and coldness of it, condensing, and rendering visible the moisture dissolved in the air.

The direction of this great mountain is from east to west, with a visible inclination to the west. Those who adopt the system of the formation of mountains, from a successive deposit of sediment from the sea, will find it difficult to reconcile their hypothesis with the structure of the mountain of Montserrat, as it is no easy matter to discover how
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the sea could give a round shape to the stone, or how quartz, sandstone or touchstone, could conglutinate so firmly together; but this must be left to more able pens to discuss: I shall only add, that it is impossible to view this amazing mountain without the utmost admiration; its name has been extended to one of the British islands in the West Indies, and its fame is universal: its prodigious clefts impress the mind with such wonder, that it has given rise to the opinion in common with Gaeta in Italy, § that these tremendous rocks were suddenly rent in this manner when our Saviour gave up the ghost on the cross, when "*The earth did quake, and the rocks rent.*" *St. Matt. c. 27, v. 51.*

LETTER

§ The singular rock of Gaeta in the kingdom of Naples, has an amazing cleft from the top to bottom, and is totally rent asunder, which they tell you happened at the death of our Saviour; a large block of marble has fallen in between, on which they have built a little chappel, dedicated to the Trinity, and ships passing near salute it; this place is held in great veneration, particularly in Spain; during the wars in Italy, *La Santissima Trinidad de Gaeta* was greatly resorted to, and a constant invocation. There is a good plate of this rock in the "remarks on several parts of Europe by John Breval, Esq; author of the former remarks. London, 1738."

L E T T E R XIX.

Singular mountain of fossil salt, near the town of Cardona, in Catalonia, as described by Don Guillermo Bowles.

THE town of Cardona is sixteen leagues from Barcelona, at no great distance from Montserrat, and near the Pyrenees. It stands at the foot of a rock of salt, which on the side of the river Cardonero appears cut perpendicularly, forming a mass of solid salt between four and five hundred feet high, without the least crevice, fissure, or strata, nor is any gypsum to be found in the neighbourhood. This amazing rock is about a league in circumference, and much about the same height as the adjacent mountains, but its depth being unknown, it cannot be ascertained on what basis it rests. The salt is commonly white from the bottom to the top, though in some parts it is red, which the people of the country cut into pieces like bricks, and think it of use for pains in the side, by applying it to the part after being moderately warmed; sometimes it is of a light blue, but these colours are of no importance, as they disappear in grinding, the salt remaining white, and being eatable, having no flavour or taste either of earth or vapour.

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This prodigious mountain of salt, divested of any other substance, is unparalleled in Europe; philosophers have an ample field to study its formation; it will not be sufficient to say, it proceeds from an evaporation of the sea, as this will not be deemed satisfactory.

In the shop of a sculptor at Cardona, I purchased several figures, candlesticks, caskets, and other toys cut out of this salt, as transparent as crystal: when one of the workmen was carving a candlestick, I observed he wet it with water, then rubbed it dry with a towel, and wiped off the white powder which ensued on the working of it, and gave it a greater transparency. The salt is so hard and compact that water will not dissolve it if it is soon rubbed dry again.

This mountain has a considerable surface, nevertheless the rain does not diminish the salt.* The river which runs at its foot is briny, and when it rains the saltiness of the water increases, and kills the fish; but this effect does not extend above three leagues, beyond which fish live as usual.

After many experiments which I made with the water of this river by evaporation distillation, and various

* Perhaps not sensibly; but how shall we otherwise account for the addition of salt to the water mentioned in the next sentence.

various different processes, I never could discover in it, the least grain of salt, which persuaded me that the salt was entirely decomposed by motion, and dissolved into earth and water. The water of the Tagus, which passes between hills of gypsum and sal gem, at Aranjuez, is bad in that spot, but at Toledo it is good; soapeasily dissolves in it, and a little lower down, if it is distilled, not the least particle of gypsum or salt is to be found.* If we burn sulphur, arsenic, pitch, or other combustible matters at the foot of a tower, none of those that are near it can bear the stench, while those above will not perceive it; because it entirely decomposes into water and earth before it reaches them, and the inflammable principle which is inodorous rises anew to form fresh combinations, and occasion thunder and lightning. I should think the emanations of malignant fevers, and of the plague, follow the same laws.

It is commonly said, that of the three acids of nature, the nitrous, which is the second in strength, ejects the marine, which is the third and the weakest, but experience is contrary to this doctrine, since in Spain the sal gem ejects the nitrous acid from its basis: grind twenty-four ounces of this salt with twelve of salt-petre, let them be distilled in

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* These curious facts merit a further examination, as the present illustration is by no means satisfactory.

the usual manner, and the result will be a very good aqua fortis, which will readily dissolve silver, and have no effect upon gold. The silversmiths of Madrid use no other. To clear up more fully this singular phenomenon, and see whether the chemists are mistaken or not, nothing is left but to ascertain whether this sal gem contains a vitriolic acid, because in such case it would not be the marine acid that was more powerful than the nitrous, but the vitriolic : however as it has not been demonstrated or known, that any such vitriolic acid exists in common salt, the difficulty still remains. This singularity of the Spanish sal gem merits the attention of chemists and repeated experiments ; as this system seems to militate against the received opinions concerning the nature of the three acids, the master-key of chemistry, and overturns the theories now in vogue. §

What rhapsodies have been published with respect to the physical causes of the saltness of the sea, some saying that immense beds of salt existed at its bottom ; others, finding this argument destroyed itself, had recourse to the idea of rivers bringing

§ Mr. Bowles seems to have drawn his conclusions rather too hastily, without reflecting that nitre when divided to a certain degree and kept divided, may by the force of heat ~~alone~~ be deprived of its acid ; whilst common salt can sustain a much greater degree of heat without any decomposition.

ing down salt enough to the sea to impregnate its waters, which supposition is as false as the former, as we are positive that sea water is at present as briny as it was in ancient times in proportion to its situation, temperature, evaporation, or quantity of fresh water running into it ; besides this, I have made several experiments, but never found salt at the mouth of rivers, where they disembogue into the sea. It is true, that sometimes after distillation and evaporation I have found a thousandth part of common salt, and I once discovered as a *residuum*, a little nitre ; but this proves nothing, and with respect to the nitre, I consider it to be a *residuum* of common salt, being persuaded that this may change its acid and alkaline basis, and become nitre with motion and ebullition, and reciprocally nitrous, and the alkaline basis change into common salt.†

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† It would have been acceptable to the chemical readers, if Mr. Bowles had favoured us with any sufficient reason to support this belief.

L E T T E R XX.

Observations made by Don Guillermo Bowles, on the roundness of pebbles in the beds of rivers.

THE pebbles of which I am now going to speak, are those which are commonly found in most places without angles, or points, and though not perfectly round, have yet more or less that form, with a smooth surface. They are composed of various matter, and the first idea which occurs of their having acquired this smoothness, is from their rubbing against each other, or some harder body ; this being the method we use in order to give such a polish to any substance, and as these stones are frequently found in large quantities in the beds of great rivers, it is very easy to say they have been brought down by the waters, and become smooth by their constant friction. For my part, I was always of this opinion till my arrival at Aranjuez, where I discovered the fallacy of this reasoning, for I clearly perceived that the stones in the bed of the Tagus never moved from their places. This of course staggered my former belief ; I was confirmed in my new principles by a variety of observations, but to avoid being prolix I shall only offer
a few

a few of them, which have all the appearance of being decisive in favour of my system. §

There are no pebbles more singular than those crystalline ones found in the bed of the river Henares, near San Fernando ; now if these pebbles had any progressive motion, let it be ever so small, they ought certainly by this time, after so many ages, to have reached the bed of the Tagus so near them, yet none are to be found there.

The Tagus is full of calcareous stone at Sacedon ; a little lower, at Aranjuez, not one of these is to be found in its bed.

The kingdom of Jaen near Linares, there is a hill chiefly composed of round smooth stones, about the size of an egg ; the smooth polish of these and their roundness cannot be attributed to rains, because they are not exposed to them, nor dispersed on the surface of the hill, but buried underneath at a considerable distance : nor much less can it be attributed to any river, for I do not know from what system, or by what chronology, it may be conjectured that any river ever run over that eminence.

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§ Mr, Bowles tells us, he looks upon this as one of the happiest discoveries he ever made, as striking him in a forcible light, and serving as a key tending to illustrate the true physical theory of the earth ; but in what manner it had this effect he has not informed us.

In the village of Maria, three leagues above Zaragossa, there is a broad gully full of quartz, sandstone, and limestone, and gypsum of a perfect white, yet at Zaragossa the Ebro contains none of these sorts.

I believe no body has ever seen in the bed of the Ebro large or small round granite stone, nor blueish stone veined with white, but the Cinca before it empties itself into that river is full of them : in so much that it carries no other sand but these stones reduced very small, near San Juan in the valley of Gistau.

The river Naxera is full of small sandy stone, and of white quartz resembling little almonds, mixed with others of a red colour. This river runs into the Ebro, in whose bed when it passes by Zaragossa, none of these sorts of stones are to be seen.

The bed of the Guadiana has in its different parts the same kind of pebbles as are found on its banks, and on the adjacent hills, without being mixed with those that are found a league higher or lower ; and at Badajoz, where the country is without any stone, none are to be found in the bed of the river.

This holds good not only in Spain, for I have taken notice of the same in other countries ; not
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to multiply examples, I shall only offer what has fallen under my observation in France; the river Alier at its source, about half a league from Varenne, contains a great variety of pebbles, of red and yellow quartz, of the same nature as those in the fields in its neighbourhood; but I could not discover one of these pebbles in this river, when it passes by Moulins, where nothing is seen but coarse sand.

The Loire at its source runs over an immense quantity of small pebbles, lower down, none are to be seen when it passes by Nevers, where the bed of the river consists of sand and large pebbles the same as the adjacent fields.

There is a great deal of pebble and flint in the river Jonne, before and after it passes from Sens, because its banks are covered with it from Joigny. The Jonne enters into the Seine above Paris, and yet I do not believe any body has ever seen one of these pebbles go through the *Pont neuf*, and what is more, nobody has ever seen the Seine bring any sort of limy pebble along with it in passing through Paris, either round or of any other shape.

What happens in the Rhone is still more conclusive, and as several writers have spoken of it, and of the Lake of Geneva in a manner which is incom-

incomprehensible to me, I shall briefly relate what I have seen. A valley flanked on one side in part by the Alps, and on the other by Mount Jura, forms the Lake of Geneva, which is about eighteen French leagues in length: a small river with a great many brooks falling from the mountains on its sides fill the cavity of the valley, and the water which overflows, forms the river Rhone near the city; as its depth there, is less than in the centre, and the water extremely limpid and transparent, the pebble is seen at the bottom covered with moss; the waters even with the highest winds never moving them from the first spot where they fell in. The Rhone after it has quitted the lake runs for some leagues over a bed of pebble, and then enters a narrow gorge formed by two rocks cut perpendicularly, then passes by the mountain of Credo, at whose foot the river disappears, for reasons very different from those with respect to the Guadiana.

The Credo mountain is a composition of sandy earth full of round stone, from its summit to a considerable depth. There is another similar mountain opposite to it in Savoy, likewise full of sandy, limy pebble, granite, and flint; the Rhone passes between these two mountains: as the basis of the Credo consists of strata of limy rock of different degrees of hardness, the waters in course of time
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have eaten their way through such beds as happened to be of a softer nature than those above and below, and made themselves a passage between them. I crossed the upper rock, which penetrates the basis of the two mountains, and over the river, went from France to Savoy in less than a minute, as it is not forty paces from one shore to the other. This singular vault is pierced in some places, and the water gushes out at the apertures, foaming like boiling water amongst those enormous pieces of broken rock. This is what is commonly called *La Perte du Rhone*, and may be about sixty paces in length. At another place it is less, about a musket shot higher up, from a similar cause, of the river meeting with a strata of less resistance, where it has formed a passage which it enters with no inconsiderable violence.

This phenomenon being explained, I reason in this manner: If stones were carried forward by the motion of the rivers, these cavities through which the Rhone passes should be full of them, for though the strength of the current would hurry them forward, there are so many holes at the bottom, and so many detached pieces of rock to stop them, that some would unavoidably be interrupted in their passage, and many be found there, but I could not discover the least appearance of such, notwithstanding that the bed of the river

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from Geneva to this place is in a manner crouded with them. I therefore conclude that these pebbles never move from their place; and what is still more convincing, there is not a single pebble in these vaulted places, excepting such as are found on the banks of the river, in the long course of which there are many of all shapes and forts, at least as far as Lyons; nevertheless I do not believe any one has perceived such stones at its entrance into the sea, nor in the gulph of Lyons, where this river loses itself.

I will add one observation more, though perhaps I have given too many already. A few paces from the occultation of the Rhone you cross the river Valfeline, which has its source near Nantua, in the high Bugey. The bed of this river is full of pebble, because the hills and plains through which it passes are equally so. There is a place where it forms a cataract with great violence, when the water runs into a cavity; now if it brought any pebbles along with it, they would certainly be found in this cavity, but it is a fact that none are to be found there. When I went to Geneva I threw some remarkable stones into the river above this gap, and at my return I found them in the very identical spot without having been moved in the least.

If I am asked how all these pebbles come to be so round and smooth, and to have lost their sharp points,

points, I shall freely acknowledge that I do not know the reason, that I have ideas of my own concerning them, but do not venture to insist on them. Any hypothesis would have more weight with me than the common one, that the motion of waters or rivers has been the cause of the roundness of stones, for who can have resolution to embrace a system which would engage him to hold that the Rhone for instance had traversed the summit of the mountain of Credo, one of the highest in the world, all composed of such pebble ; and the same reasoning must be allowed to many other mountains with similar appearances in different parts of the world.

Sometimes, it is true, stones and pieces of rock are hurried forward in rivers, and brought down by torrents after storms ; the same may happen in streets and cities, but this is not extraordinary, when the declivity of the situation is considered, which gives additional power and force to the water, occasioning a natural effect, which ceases when such bodies come to a place where they will be at rest. This will account for such stones as have been rolled down into the beds of rivers by their natural weight, when the earth which supported them has given way.

Supposing then this notion to be exploded, the difficulty still remains to account for their smoothness

ness and roundness, which is no easy matter to explain, being involved with many perplexing circumstances, which I shall leave to be elucidated by others more intelligent than myself. It is certain that water and time are two powerful agents that can bring about surprising effects. The world is full of these round stones of various sizes and appearances, they are found in vallies, on hills, and at a considerable depth in the earth, as well as on the summit of the highest mountains. I have seen round diamonds covered with a light scurf, sapphires and oriental topazes round like cornelians. The crystal of the Rhine never becomes round, because in its natural state it is not angular, and forms a mass already round, the reverse of common rock crystal, composed of *laminæ* of a regular shape. Many of the learned have been deceived by these crystals of the Rhine, thinking, because they found them at two leagues distance from Strasburg, in the midst of the fields, that the river has altered its bed, entertaining that fond notion, of the waters carrying them along; at the same time, they did not consider that they are not to be found a few leagues above Dieux Brisac, nor any where below Strasburg. Therefore if these rivers carried such pebbles in their course, they would have them at their mouth, where they enter the sea, and there would be no sand banks at these places, for the stones would fill up the cavities, and the

the waters would roll over them, which certainly is not the case. The very bottom of the sea would suffer some change from the great quantities of stones brought down by so many rivers, and forced into its bed, from whence it would follow, that the observations of the sounding line would no longer be of use to the mariner, who always finds the same bottom when he heaves the lead at one time as at another.*

LETTER

* True with respect to the British Channel, and of which I have been often an eye witness, and seen the same kind of sand, small shells, and pebbles, brought up at the bottom of the lead as were described in charts published many years ago, by which the mariner on entering the channel in a dark winter night can know in what part he is in ; but this is not the general use of the sounding line, which is thrown out occasionally, to know the depth of water, and number of fathoms, when approaching the coast, or amidst shoals, and in every situation of danger. Will Mr. Bowles persuade us, contrary to ocular conviction, that great quantities of pebble are not daily thrown up upon the beach by the waves, and choak up the mouth of harbours, while others are brought down by rivers with similar inconvenience ?

L E T T E R XXI.

Describing the hot wells at Caldas in Catalonia, and those of Caldetas, near the city of Mataro.

AS I had not an opportunity of visiting the hot wells and baths of *Caldas* in Catalonia I was favoured with the following account of their situation and present state, by my worthy friend William Gregory, Esq; his majesty's consul at Barcelona.

“ There are several hot wells in the neighbourhood of Barcelona, but the principal spring is at Caldas de Monbuy, about five leagues North of Barcelona. The town takes its name from the waters, but at present is much decayed and dwindled into a very inconsiderable place, with a few priviledges to support its rank as a town, though it was once the capital of a district inhabited by a people known in the earliest periods of the annals of Catalonia, under the denomination of *Aquicaldenses*, of whom frequent mention is made during the contest between Rome and Carthage for the dominion of that part of Spain, sometimes taking part with one side, sometimes with the other. The greatest part of a slight antient wall remains, as also its four gates, which are still kept in repair ; but the castle of the lord of the manor,

nor, though of a late date in comparison with the rest, seems to have been abandoned for some years, and is in a most ruinous condition. Caldas is situated in a very romantic part of the country, which rises into abrupt hills all round, and in a manner encircle it. These hills, or rather mountains, are for the most part covered with olive groves, which yield a considerable quantity of oil, for the extraction of which the hot water that flows so plentifully in the town is of infinite use. As this is at present in no wise recommendable, either for its elegance or accommodations, you may well imagine that the baths are not much frequented with a view of dissipation or pleasure, but numberless are the votaries of health that visit it from all parts of the country in spring and autumn, and they are accommodated in the best manner that a Spanish country town can afford. Some of the apothecaries, and many of the private houses at Caldas have neat baths for those that choose to hire them; and there is an hospital where the poor are admitted gratis. Various are the virtues that this water is said to possess, and many the cures that it daily performs, in scorbutic, scrophulous, as well as rheumatic complaints, stiffness in the joints proceeding from old wounds, &c. I cannot however pretend to describe to you any of its particular qualities, such as what mineral it is chiefly impregnated with,

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with, or the cause of its extraordinary heat, or any part of its analysis, having had but little time during my residence in that country for the investigation of things of that sort, and I never found any of the inhabitants that could give me satisfactory account about the matter, all that I know of from my own observation, is that it rises much hotter than either the spring near Aix la Chapelle, or those of Bath or Bristol; it is boiling hot, and the people of the town come constantly there to boil their eggs, cabbage, and all sorts of vegetables, by simply suspending them under the spout of the fountain in a basket, and yet make use of no other water, when sufficiently cooled, for drinking either alone, mixed with wine, or cooled with snow in orgeats, sherbets, &c. Some years ago there was a short treatise written on the qualities of these waters by some well-disposed and intelligent person; a few detached sheets of this work once fell into my hands, when I was at Caldas, but the whole edition has now some how or other disappeared. The general opinion is, and I believe not without foundation, that some invidious persons after the decease of the author, made a point of buying up the work, and have secreted or destroyed every page of it, except here and there a few copies that fell into the hands of ignorant people who tore them to pieces without consideration.

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Another hot spring flows in the village of *Caldetas*, which likewise takes its name from the waters, like the former, though expressive of a less degree of heat in the water, as well as the inferiority of the place in respect to the other. This village is about two miles from the city of Mataro, near the sea side, and is also frequented by persons afflicted with the above-mentioned complaints in a slight degree, for the water being only tepid, it has not the efficacy of the hot water at *Caldas*. Those of *Caldetas* are also taken as a purgative, and are not fit for any culinary purpose. You will easily conceive that those watering places differ widely from what are so called in other countries, being solely frequented by the infirm out of *pura necesidad*, and are therefore indifferently supported; was the beneficial improvement of England to take place, it would in a short time extend the reputation of these salutary waters, and make them rival, if not out-do Spa, Aix la Chapelle, Bareges, and most of the noted places on the continent, over all which the famous baths of *Caldas* have such an undoubted superiority in point of climate and situation.

L E T T E R XXII.

Remains of ancient volcanos in Spain.

IT is not my intention to advance or add any new hypothetical theories to the many that of late years have been offered relative to the grand subject of volcanos, and how far in conjunction with earthquakes they have been the powerful causes of the great inequalities and shattered condition of the surface of the earth. Varieties of specimens of rock, stones, and earths, bearing evident marks of a former fusion or calcination, have been collected, though found in places where no volcanos at present exist, yet leaving no doubt of their having formerly existed, and that ages have elapsed since their extinction : this subject of late years has more particularly engaged the attention of curious travellers, and ingenious writers of different nations. Sir William Hamilton, his Majesty's envoy at the court of Naples, has not only given a more perfect account of the eruptions of Vesuvius, but has considerably enlarged the field, and brought to light new and important discoveries, with respect to the volcanic eruptions of Italy. Those of France and different parts of Germany have been likewise laid before the public, but those of Spain remain still unobserved,

unobserved, and Mr. Bowles appears undoubtedly to be the first who has discovered any remains of volcanos in that kingdom, which is the more remarkable, in a country where they have so many individuals that must have seen those famous ones of Pinchina, Cotopaxi and Chimborazo in Peru, the most extraordinary and amazing volcanos in the world ; with respect therefore to the Spanish volcanos, I shall confine myself to such facts regarding their appearance as are stated by Mr. Bowles, and for the consequences to be drawn from them, must refer to what has been already said on this subject, and to the great book of nature that lies open before us. “ I have seen, says Mr. Bowles, many mountains in Spain with evident signs of volcanic conflagrations, no account of which is handed down by record, or even any tradition remaining : between Almagro and Corral in La Mancha, near the river Javalon, on the road to Almaden, pieces of rock may be seen with evident marks of fire, and many stones rather weighty may be seen lying in the fields of a sooty colour inwardly and outwardly, with all the appearance of having once been in a state of fusion.

There is a great mountain near the sea, between Carthagená and Murcia, where there has been a volcano, the aperture of which still remains, and is looked upon by the country people as an enchanted cave ; there are five similar ones in the territory of

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Murcia,

Murcia, there is one near Carthagena, with visible remains of an alum mine, having this additional circumstance for the more readily finding it, that there are four springs of hot water near it. The red earth, of Almazarron used in the glass-house at St. Ildefonso, as well as the other species of red earth in various parts of Spain, employed for different purposes, are undoubtedly produced by volcanos. At the entrance of Cape de Gat there is a mountain towards the sea, on the side next Almeria, consisting chiefly, in one part, of stone larger than ones arm, crystalized in equal layers, delicately fixed to a certain height, of a cinereous colour, as iron was wanting to give them another hue in the fusion, for their shape evinces the effect of having cooled by degrees, according to the laws of crystallization ; it is true nevertheless, that there are ores of a pale colour, with crystalized bodies of a perfect white, which are of the class of vitrescents ; I have not seen them, but Mr. Godin informed me, that he had observed such not well crystalized, in the high and stupendous mountain near Quito, covered constantly with snow and its bowels in combustion, the result of a horrible volcano. In Catalonia, between Gerona and Figueras, near the sea, there are two pyramidical mountains of equal height, whose bases touch, having every appearance of a former volcano ; and though at their bases impressions of shells are frequently seen, they
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are of a later date than the volcano ; when these petrefactions are found near volcanos they are proofs of their antiquity.

These revolutions in our globe are no where more plainly seen than in the mountain of Montferrat. The small touchstones seen there, in a mountain of a calcareous nature and amidst those elevated and conglutinated pyramids, being of a black colour and of the same grain as the others found in Catalonia, are all from the effects of fire, and have the same ferrugineous nature, as the high columns of the extraordinary mountain of Usson in Auvergne. These pillars of basaltes were probably in a state of fusion with the iron, when they mixed with it, and their irregular shape proceeds from having cooled by degrees, like the white basaltes, if I may be permitted the expression, of Cape de Gat. The small round grains, blue and green, found in the fields near the mountain of Usson have been iron. I have seen some that were metal within, and were formerly like iron shot. Their shape may be explained from the practice observed in iron forges, when the workmen throw a ladle full of fused metal on the ground, which runs into a globular shape, and is purchased by sportsmen instead of shot.

The globular iron ore is therefore the product of volcanos as those certainly are near to Ronda
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and Befort in France, both are, as well as those of Germany, with a superficial coat, and give a very soft iron. Touchstones might be made of the pillars of Usson, as the Germans do with the basaltés in different parts of Hesse and Saxony, whose forms are more irregular than the pillars of Usson. The Giant's causeway and other places in Ireland have innumerable pillars of irregular basaltés, similar in colour and form to those of Usson, which serve also for touch-stones; the black soft flaty stones, found in the Pyrenees of Catalonia, and commonly called *lapiz*, are likewise the result of volcanos long since extinguished.

I think I perceived the remains of a volcano on the mountain of *Serrantes*, near Bilbao, adjacent to the sea at the entrance of the river of Bilbao; its figure is like a sugar-loaf, and it has been mistaken for the mine of Somorrostro, which is a low uneven hill, at some distance from this pyramid. Pliny fell into this error, perhaps from not having seen it, or from the reports of some mariners who traded in Andalusia, where Pliny was writing his history.

I never perhaps should have known that the quartz of many mountains of Spain had been calcined, if previously, at Gingenbach, in the Black Forest in Germany, I had not seen them calcine the *Kieffelftein* to soften and mix it with cobalt, and
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make zaffre; this *Kieffelftein* is a true white quartz of the antient volcanos of Spain, but to know and understand these matters clearly definitions are not sufficient, they must be seen."

L E T T E R XXIII.

Return to Valencia and Castile. Mine of sal gem at Mingranilla. Source of the river Guadiana. Mine of antimony near Santa Cruz de Mudela in La Mancha.

IN going from Barcelona towards Valencia you cross a fine bridge, lately built, over the Lobregat, at Molino del Rei §; further on, another bridge over a deep valley has been attempted with a triple row of arches at an immense expense, the foundation has given way, and a long time must pass before it is compleated. The new road was finished in 1778, as far as Villa Franca de Panades. The country is hilly and affords a variety of rural prospects. The antient city of Tarragona stands near the sea, on an eminence that commands a fine prospect over a beautiful vale.

§ In the second volume of the Spanish translation of Muller's fortifications, there are views of the bridges of Molins, Martorel, Acantara, Almaraz, and Aranjuez.

vale. The city exhibits several remains of Roman antiquities and inscriptions. The learned Don Antonio Augustin archbishop of Tarragona is buried in the cathedral†; proceeding from Tarragona the next town is Reus, a commercial place, which of late years has greatly encreased in buildings and population. Here the merchants of Barcelona have their factors and warehouses, and ship

† Don Antonio Augustin, archbishop of Tarragona, born in 1516, son of Don Antonio Augustin, vice-chancellor of the kingdom of Aragon, was famous for his writings on canon and civil law and antiquity. All the great men of his age were unanimous in their praises of his learning and virtues. He came over to England with Cardinal Pole, and assisted in such regulations as were then drawn up for the purpose of ecclesiastical discipline. Of all his works, none were more eagerly sought after than his dialogues on antient medals and inscriptions, "*Dialogos de medallas inscripciones y otras antiguedades ex bibliotheca Ant. Augustini archiepiscopi Tarracon, en Tarragona, por Felipe May, 1587, 4to.*" This edition is so scarce, that Padre Feijoo relates in his *Theatro critico*, that an English gentleman travelling through Spain offered thirty pistoles to any one who would bring him a copy, which being complied with, he offered thirty more for another. I saw this edition in the library of Don Gregorio Mayans at Valencia; there are only plates to the two first dialogues; it has been translated into Latin and Italian; a new edition of it was printed at Madrid in 1744, in the same form as the Tarragona edition, and may be had for about five shillings. The life of this archbishop has been written by the learned Don Gregorio Mayans.

ship off their wines and brandies as the ships come to an anchor in the road of Saló, about three miles from Reus. Catalonia furnishes annually thirty-five thousand pipes of brandy, which require a hundred and forty thousand pipes of wine to make them, besides which near two thousand pipes of wine are also annually exported: and of fruit about thirty thousand bags of hazel nuts every year chiefly for England, and worth about twenty shillings a bag on the spot.

It is a few hours excursion across the country to the northward, through Monblanc to the royal convent of Poblet, founded by Alfonso first king of Aragon, in the twelfth century, for monks of Cistercian order; the abbot is a temporal baron and has an extensive jurisdiction, with a considerable revenue. Several of the kings and queens of Aragon are buried in the church with stately monuments, as well as some of the dukes of Medina, celi, and Cardona: on viewing these tombs the emotions are only felt by an Englishman, that occur when he perceives in an obscure corner, on an humble stone, the name of an English Peer, Philip duke of Wharton an unhappy nobleman; at the pinnacle of glory in the dawn of life, but alas! whose evening was clouded with misery and scorn. After leaving his native country, he meanly crouched to the pretender, assumed the insignia
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of the order of the garter, bore arms against his country : abandoned and despised by all, he was kindly received in the last moments of his wretchedness, and was interred by the hospitable abbot of Poblet. Thus ended Wharton, an exile and an outcast, shewing how little availed the highest dignities, fortune and talents, without virtue and love for his country. His line is extinct, and the faint inscription on his tomb, at present nearly effaced, will soon be totally obliterated, while the energetic lines of Pope, so descriptive of his character, will hand down his failings as an example to posterity.*

It is a tedious journey from Reus to Tortosa, on the banks of the Ebro, where there is a bridge of boats that is crossed in passing to Valencia. I shall now resume the itinerary in going from Valencia towards Castile ; the ground continues to rise gradually as far as the chain of hills that divide

* The inscription on his tomb in the church of Poblet is as follows, and said to be of the duke's composition.

Hic jacet Exs. Dom Philipus Warton, Anglus, Dux, Marchio et Comes de Warton, Marchio Marburgiæ et Carlogh Comes Rathcasrem, vicecomes de Winchester Baro de Tramlon Eques Sti. Georgii alias de la Geratera, obiit in fide Ecclesiæ Catholicæ Romanæ Povuleti, die 31. Maii, 1731.

vide that kingdom from La Mancha, with a very steep ascent at the *Puerto de Bunol*. Near Utiel the country is covered with dwarf furze called *Erizo* by the Spaniards, from its similitude to the prickles of a hedge-hog: it is a beautiful plant, and at the proper season of the year is covered with blue flowers, which give it the appearance of a prodigious amethyft, forming a cup of three feet diameter, so close and firm withal, that a man might stand upon it. Clusius was the first who described and gave a plate of it. It is the *Anthyllis erinacea* of Linnæus.

The ascent still continues to Villagorda, through a rugged country, broke up every where by gullies occasioned by torrents that gush from the mountains. On the highest of them there is a quarry of grey marble, veined with red; the river Cabral runs at its foot. At its summit there is a briny spring, where they make salt with a boiling heat. It is a constant descent from these hills to the village of Mingranilla: half a league from the village, there is a district of limy soil, with some hillocks about half a league in circumference, having below this bed of lime, a solid mine of sal gem, equal to the superincumbent stratum; its depth is not known, for when the excavations exceed three hundred feet, it becomes very expensive to extract the salt; the mine frequently gives way and fills with water, which obliges

obliges them to abandon the shaft and work another near it, the whole country being, an enormous body of salt, sometimes mixed with a limy substance, and at others pure or reddish, mostly crystalline. Those who have seen no other mine might be inclined to think that the limestone forms the fossil salt of Spain, but this will not be the case, if it is found to be free from lime at Cardona, yet crystalline enough to be carved into figures, being much harder than that of Mingranilla, which is brittle like spar. §

The ground has been perceptibly carried away by torrents that have discovered the mine, for pebbles and hyacinths are dispersed in the gullies which are now seen firmly conglutinated in the lime, forming hard rock, yet leaving no doubt of their having fallen, at some period, from the hills, by what may be observed on their summit.

From hence an easy descent for about four hours, leads into the extensive plains of La Mancha,

§ Mr. Bowles says, that if the Mingranilla has less watery particles in its crystallization, it therefore attracts little of the moisture of the air, and does not dissolve in a humid atmosphere like that of springs, but this cause is hardly admissible: salt that is crystallized with a boiling heat undergoes more or less of a decomposition, is therefore less perfect and more disposed to diliquesce, than that which is formed in circumstances more favourable to its crystallization.

cha, those regions of fancy which Cervantes has rendered immortal. They have plentiful crops of saffron at San Clemente, and the best that grows in La Mancha. The onion remains four or five years in the ground, producing annually flowers; then the roots are taken up and transplanted, and the soil becomes excellent for corn, but twenty years must pass before any saffron is cultivated again. Castile also abounds with the deadly carrot, the *Thapsia villosa* of Linnæus, which according to Clusius is in great request amongst old women at Salamanca.*

La Mancha produces great quantities of lavender cotton, said to be the same with the famous *moxa* from China, imported constantly by the English and Dutch; while the Spaniards, if this is the same plant, have it at home and know nothing of the matter.†

The greatest part of La Mancha may be considered as one continued plain, as far as the eye can extend

* Its use may be seen in Dr. James's English dispensatory.

† The *santolinæ chamæcyparissus* of Linnæus. Mr. Bowles says it is an excellent specific for the gout, by being burned, on the part. It would have been of service if he had given us any further proof of its efficacy, for whatever they may tell us of the practice in India, and notwithstanding the praises of Sir William Temple, it does not seem to be in use in England.

extend without a single tree ; as the villages are large, and the churches have lofty steeples, they make a good figure at a distance, but when you draw near, their mud walls with many houses in ruins convey a quite different idea. The inhabitants, for want of wood, burn thyme, southernwood and wormwood, and though they have few springs they console themselves with drinking good wine : when one considers their manner of living in these silent villages, added to their natural simplicity, they seem to have lost little of their original character. At Socuellanos they get water about two or three feet from the surface ; but at Tomilloso, four leagues further, the wells are a hundred feet deep. From hence it is an hour's journey to Lugar-nuevo on the banks of the famous Guadiana, and only three leagues from its source ; there are many lakes hereabouts which communicate with each other, produced by springs whose waters form a river, which having run for some leagues disappears in the meadows near Alcazar de San Juan. In summer this river is trifling, but in winter it is necessary to go over the bridge at Villarta. The river disappearing there, shews itself again a few leagues off, in other lakes called *Ojos de Guadiana*, " The eyes of Guadiana ;" from whence the proverbial expression of a bridge where many herds of cattle are constantly grazing. To form an idea of such a phenomenon, we must suppose that all the ground

ground in those parts consists of some loose substance, replete with fissures and crevices, to a considerable depth, without any solid materials to resist the pressure of the water, by which means the river has less water at Lugar-nuevo than within a league of its source: after great rains it sinks so much the deeper, and fills all the cellars of the village without any visible cavity, or passage where it might penetrate. On this spot called *The Bridge* they have sunk wells for travellers and cattle, and always find water. When the Guadiana issues out of the lakes, it turns several mills, is a hundred feet broad and about four in depth. It passes afterwards by Calatrava, Ciudad Real, Medellin, Merida, Badajoz, and Ayamonte, where it enters the ocean dividing Spain and Portugal. Its singular qualities are alluded to in the following epigram of Don Juan de Yriarte, whose poems were lately published at Madrid.

Ales et amnis Anas sociant cum nomine mores :

Mergitur ales aquâ, mergitur amnis humo.

Before I quit the territory of La Mancha, whose fame will never perish as long as wit and humour remain, I must once more investigate the bowels of the earth, and speak of a mine of antimony near Santa Cruz de Mudela, at the foot of the *Sierra Morena*, which since 1774 has been successfully worked by Don Antonio Sancha, an eminent printer at Madrid,

Madrid, who after having been at a considerable expence, now gets lumps of regulus of antimony of an enormous size, one weighing a hundred and fifty *arrobas*, and many of twenty or thirty, the smallest of four or five, for which he has a considerable demand ; he has established a manufacture of *regulus* of antimony, and has wrought up above six hundred *arrobas*, so white and crystalline, as to look like silver, being superior to that of France and Hungary ; it is a valuable article in different manufactures, particularly amongst printers for making types, and is in great request at Madrid, where the art of printing is now brought to a remarkable perfection ; they are provided with good letter founders and no foreign types were made use of in the elegant edition of Sallust, translated by the Infant Don Gabriel, his catholic majesty's brother.

Sensible as I am that much more remains to be said, yet I now close my labours, though not a thousandth part has been mentioned of what the subject affords : moreover the kingdoms of Leon, Navarre, Galicia, and the principality of Asturias, remain yet to be treated of, which perhaps may be brought forward hereafter, at a more favourable opportunity.

T H E E N D.

A P P E N D I X.

P A R T. I.

L E T T E R I.

WHEN Spaniards speak of a *peso* only, they mean 15 reals vellon, or a current dollar, an imaginary coin, and not the *peso fuerte*, or *duro* of 20 reals vellon, an effective coin both in gold and silver. This distinction however holds good, merely in Spain, for in America they know only the *peso fuerte*. The *dobloon*, or *pistole*, is also an imaginary coin of 60 reals vellon, or three hard dollars, but the *doblon de oro* is a gold piece, worth 75 reals vellon. In currency you find as much American coined money as Spanish, particularly silver and old gold. In Spanish America they have no copper money. Gold and silver is coined at Madrid and Seville, copper at Segovia. The new coinage consists of

G O L D.

Reals vellon.

A Gold piece of four pistoles worth	-	300
The half, or double <i>doblon</i>	-	150
The <i>doblon de oro</i>	-	75
The gold crown	-	20

S I L V E R.

Madrid silver crown, or <i>peso dura</i>	-	20
The half	-	10
<i>Peseta</i>	-	4
<i>Real de plata</i>	-	2
<i>Realito</i> or <i>real de vellon</i>	-	1

G g

C O P P E R.

C O P P E R.

Piece of	-	Two <i>quartos</i>
		One <i>quarto</i>
		One <i>ochavo</i>
		One <i>maravedi</i> , the least coin in Spain.

N. B. A *real de vellon* is worth 8 *quartos* 2 *maravedis*, or 17 *ochavos*.

According to the old coinage, the par of exchange between England and Spain was settled at 40 pence sterling for a Spanish current dollar of 15 reals vellon, and this varies in proportion with the balance of trade between the two kingdoms. According to the new coinage, the par may perhaps be less. In speaking of the hard dollar in the course of this work, I have followed the example of Dr. Robertson, and fixed it at 4s. 6d. sterling, which will answer every purpose of an historical enquiry.

L E T T E R V.

Since my return to England, an ingenious correspondent in Spain has favoured me with the following observations relating to the salt given to the *Merino* sheep. "I cannot think Mr. Bowles's account of the quantity of salt given to the sheep exact, for I have two or three times met these flocks of *Merinos*, and always asked the question: sometimes the answer was *Conforme* (a Spanish mode of speech when a direct answer is not ready) but that meant only with respect to weather and the kind of soil the sheep happened to be feeding in. I never found the quantity of salt any thing like what Bowles says; I understand

understand that in the northern parts of Spain they give salt in small quantities to their oxen, and sometimes to their horses."

L E T T E R VI.

The quantity of land necessary to sow a *fanega* is called a *fanegada*. The *fanega* measure, besides corn, is further used for chesnuts, beans, acorns, various kinds of seeds, fruit, and salt. Half a *fanega* is called an *almud* in many parts of Castile. 12 *celemines* make one *fanega*, four *fanegas* one *caiz*. A *fanega* of good wheat weighs from 90 to 100 lb. A Spanish lease cannot exceed $9\frac{3}{4}$ years.

L E T T E R VII.

It is a difficult matter to ascertain the exact population of Madrid; for its size it is populous, perhaps may contain about 150,000 souls, something more or less.

The longitude of Madrid, according to Don Thomas Lopez, geographer to the king, is found by the most accurate modern observations to be $13^{\circ}. 49'. 30''$. reckoning from the island of Ferro, or $12^{\circ}. 47'. 30''$. from the peak of Teneriffe, from whence Spanish navigators reckon their longitude. The Spanish astronomers who followed the Alfonsine tables, drew their first meridian at Toledo. Don Thomas Lopez justly censures L'Abbe Vallemont, a French writer, for saying in his *Elements de l'histoire*, that the Spaniards drew their first meridian at Toledo, because Adam was the first king of Spain, and that God

placed the sun over Toledo at the creation ; when in fact they only imitated the example of other nations, in drawing their meridian from the place where the first observations were made, as Ptolomy did at Alexandria, and amongst the moderns, the English at the observatory at Greenwich, and the French academy at their observatory near Paris.

When Mr. Bowles says, Madrid is supplied with provisions at all hours, *a todas horas*, it seems rather an exaggeration : early in the morning, it is. Madrid is well lighted, but the lamps are not lighted on moon light nights. With respect to the invention of Joseph Lucatelli, mentioned in the philosophical transactions, his machine is called a *sembrador*, or seed box, and at once ploughs, sows, and harrows, whereby the sower's labour is saved, and the grain falls in order, and in the bottom of the furrow, and remains at the same distance under ground. There is a plate of it in Mr. Duhamel de Monceau's treatise on husbandry, but as it is liable to many exceptions, particularly in stoney countries, and that other improvements have since been made of more general utility, it is deemed needless to enlarge any further concerning it, as a full description of it is given in the work above-mentioned. See " Practical treatise of husbandry, by Mr. Duhamel de Monceau, translated by John Mills, 1759."

Three or four years ago there was a *zebulo*, or *cibolo*, alive at Aranjuez. In the gardens there are two basons of water, in one of which a small elephant has water falling out of his trunk, in the other bason there is a figure of the *zebulo*.

The

The following description of the Crested Falcon may be added to what has been already said of that bird.

“*Falco Cristatus*.—Corpus magnitudine gallo-pavonis, caput crista verticali ornatum, temporum genarumque pennis erectis cinereis, rostrum aduncum, cera nigra, mandibula inferiore rectiuscula, dorsum, alæ, gulaque nigræ, abdomen album, cauda fasciis quatuor cinereis transversis : ob animalis ferociam rectrices numerare non licuit. Habitat in *Carracas*. Nulla hujus novæ speciei mentio facta est a Cl. Linnæo.”

L E T T E R VIII.

The expedition against the wild cats at Cuerva, about fourteen leagues from Aranjuez, beyond Toledo, is usually made when the court is at Aranjuez, at a very great expense, perhaps little short of £1000. a cat, as the Rev. Mr. Clarke has related. They are a large mountain cat, not very fierce, and do little more harm than destroying some game.

A few camels breed at Aranjuez, and many buffaloes, the camels carry burthens, and the buffaloes draw in the carts. The king has a stable for his stallions called *Casa de Monte*. The famous jack asses called *Burros padres*, are kept at Villa Mayor, about three leagues from Aranjuez, on the road to Toledo.

There are 21 *depositos*, or magazines for corn, at Aranjuez; these are inverted cones under ground, the earth only cleared out, which will hold 1000 or 1500 *fanegas* each, and preserve corn dry for several years.

Amongst

Amongst the many fine trees in the gardens of Aranjuez, the lote or nettle tree, the *Celtis* of Linnæus, is one of the most beautiful, and is a large tree which has a most pleasing effect.

L E T T E R X.

St. Ildefonso gardens, are said to have cost between seven and eight millions sterling, a great deal of which was expended by the late king Ferdinand the 6th, to perfect the improvements of his royal father.

Amongst the pictures of St. Ildefonso, are two Claude's, the drawings of which are in the Duke of Devonshire's collection, and have been lately published by Boydel.

Ice to be found in hot weather in most parts of Spain, very cheap at St. Ildefonso, for a farthing a pound. Water sellers are very numerous every where, always Frenchmen, from Beame, and Gascony, who drive asses about with barrels of water, the poorest Spaniard thinking it beneath him to follow so mean a livelihood ; but if water is wanted in a glass for immediate refreshment here, the Spaniard stretches out his hand, and helps you, and presents a few carraways to give it a relish. Others sell barley water, and likewise a nasty sweet composition called *xarope*.

The method of cooling water, and preserving it in cellars or caves, was first introduced into Spain at Valencia, by Don Lewis Castelvî, a gentleman of the emperor Charles Vth ; on this account the people of Valencia gave him the name of Don Lewis de la Nieve. In the reign

reign of Philip III^d, Pablo Jarquies first invented a mode of laying a tax upon preserved snow.

The storks leave St. Ildefonso about the 12th, or generally before the middle of August, and they come to Madrid about the beginning of February. There are many of them at the escorial, not above one or two nests at Madrid. The swallows begin to assemble for their departure by the middle of September.

The new altar of fine marbles in the cathedral of Segovia was a present from Charles the III^d, and cost about £8000. sterling.

L E T T E R XI.

The *Garvanzo* from Old Castile, is a large yellow pea, but not a delicate pea, and never used green; is always boiled, and makes part of the *puchero* or *olla*, the favourite dish which all Spaniards dine upon. This dish is called *olla podrida*, when it consists of beef, mutton, fowl, ham, pig's feet, garlic, onions, &c. so called as every thing is boiled down for a long time; though Andreas Bacio, a Roman physician, in his book de *Natura vinorum*, says that *podrida* is the same as *poderida substantial*. Such might perhaps have been that *olla* of Vitellius, mentioned in Suetonius, and names *Clypeum Minerva*. See Covarrubias *Tesoro de la lengua Castellana*.

The *Berengena* is an esculent fruit, greatly cultivated in Castile, and is also a favourite part of the Spanish *olla*. They are so fond of it at Toledo, that the people there are called *Berengeneros*. This plant produces a
fleshy

fleshy fruit, about the size of a swan's egg, of a dark purple on one side and white on the other. That sort which is white is sometimes called the egg plant. It is the *solanum melongena* of Linnæus; in English, the mad apple. It is said to have several bad qualities, and that they shew themselves in the face by giving it a livid and dark green colour. It is humourously introduced in Don Quixote, speaking of *Thomas Cecial's* nose, which besides being full of warts, was also *de color amaratado como de berengena*. It grows naturally in Asia, Africa, and America as is commonly eaten by the inhabitants, and was probably introduced into Spain by the Saracens, according to its Arabic name.

L E T T E R XVI.

The peaches called *pavies* are of the sort named *amygdalus persica* by Linnæus, but for a more particular account of them see Duhamel on fruit trees.

All fruits grafted though upon their own stocks of the same kind of fruit improve, as is evident from the grafted chestnuts of Spain. The Spanish *castano* is the *fagus castanea* of Linnæus, they graft upon that species of the family of chestnuts which Linnæus calls *fagus castanea sativa*.

L E T T E R XVII.

In the lordship of Biscay no troops are raised in time of peace; in war, every inhabitant without distinction is a soldier, so that the custom of *Quintas*, every fifth man,

man, as in other parts of Spain is not in use. They have public armouries in the three provinces of Biscay, and the arms are delivered out to the men who are exercised by experienced officers. They have moreover erected twenty batteries on the coast at their own expense, and raised the regiment of Cantabria. According to the laws or *Fueros de Biscaya Ley 5. tit 1.* the Biscayners are to serve his majesty at their own charge, they also furnish considerable drafts for the navy, and present the king with a free gift, in consequence of which, and their extraordinary courage and fidelity they are freed from taxes, though they pay a patronage to the king as their sovereign lord, besides other royalties and tythes; so that when every thing is considered, the nature of their country requiring the utmost spirit of industry, to cultivate, they contribute a full proportion towards the state as well as their neighbours.

In antient times, when the Catabrians were taken prisoners and tortured by their enemies, they would sing under the most excruciating pains, and bid defiance to their captors as the savages still do in North America. At present they are a brave and hospitable people, famous in peace and in war, as statesmen and soldiers, never yielding to fatigue, as Silius Italicus has described them;

Cantabar ante omnes hyemisque æstusque famisque
Inviçtus.

Thus they held out 70 years against the Romans in the zenith of their power, and only submitted when Augustus came in person with his victorious legions, to whom

whom the whole world, known at that time had submitted, as Horace tells the emperor.

Te Cantaber non ante domabilis,
Medusque et Indus, te profugus Scythes
Miratur, o tutela præfens
Italix Dominæque Romæ! Lib. 4. Od. 14.

According to Brantome, the Spaniards were the first who were armed with muskets, and if we believe that writer, they were considered as the best infantry in Europe. Muskets were first used by the English at the siege of Berwick in 1521.

L E T T E R XXV.

The following article was inserted in the Madrid gazette of the 15th of January 1779: "Many petrifications of elephants bones are continually found in the excavations made near the bridge of Toledo at Madrid. Two elephants teeth were lately dug up entire, the one about 33 inches long, and the other about half that length. Large pieces have likewise been discovered which by their size seem to have belonged to six different elephants, of whose teeth there are nine pieces and part of the jaws, as also the teeth of some unknown animal, all which are deposited in the royal cabinet of natural history at Madrid."

PART

P A R T II.

L E T T E R III.

THE love apples mentioned in this letter, which escaped the rapacious tooth of the locust, were of the second species, as described by Miller, called by the Spaniards *Tomates*, commonly cultivated for soups, and used in many sauces, giving them a very agreeable and pleasing flavour. The *solanum lycopersicon* of Linnæus.

L E T T E R VIII.

No English built ship of more than 150 tun burthen can go up to Seville. Several English vessels go there every year to load oranges. Some go out fully loaded with English manufactures, others are chartered by the fruit companies in London and sail in ballast, to take any goods that are ready, without waiting for a cargo. They most commonly come to anchor at *La Puebla*, a few leagues below Seville, and the fruit is sent down to them in boats; others go no higher than the Red Cliff, and some ships load fruit at San Lucar de Barrameda, at the mouth of the Guadalquivir where there is a dangerous bar, and no ships can enter without a pilot, some ships are loaded with Seville oil for the London market, which

which sells from £30. to £40. sterling per tun of 236 English gallons. The island of Majorca also furnishes about 7000 pipes of oil annually.

Mr. Guthrie, in his new edition of modern geography for 1780, says, that Seville, next to Madrid, is the largest city in Spain, which is just the reverse; Seville is larger than Madrid, and this last is not a city but only a town, where the royal family principally reside.

In the cathedral of Seville there are said to be ninety painted windows that cost 1000 ducats each (about £125. sterling each) valuing the ducat at eleven reals vellon. The first pearls brought from America were presented to this cathedral, and serve to adorn a complete set of rich vestments.

In the snuff manufacture about 12000 people are said to be employed at five reals vellon per day. They import tobacco from England and work it up with their own, colouring it with red earth called *almagre*, as has been already described. Their own tobacco costs them five reals vellon per pound, and is sold in snuff at 32 reals vellon, by which the king is said to clear annually about 600,000 dollars.

Great numbers of bustards frequent the banks of the river of Seville, the Spaniards call them *abutardas*. Pliny says the Spaniards call them *aves tarde*, from whence it is conjectured that the Spanish appellation was their original name, which was given them on account of their slow pace and very heavy flying, being large birds; in Scotland they call them *gufetards*.

In

In the spring, they catch great quantities of a fish near Seville, called *savalo*. The favil, which at that season is reckoned delicate, however the Spaniards think them a moist and cold food, as they have a proverb concerning them, *Si no te quieres casar, come savalo por san juan*; "If you do not choose to marry, eat favil at midsummer."

L E T T E R IX.

Old writers are obscure in speaking of the river Tinto. Covarrubias, in his *Tesoro*, says, it is also called river *Azeche*, signifying black earth found on its banks, which serves to make ink, and is called *Tierra de Sevilla*; Rodrigo Caro, who wrote the antiquities of Andalusia says, a great deal of *azige* grows on its banks, "*Criafe en sus orillas mucho azige.*"

L E T T E R XIII.

Spanish horses have ever been admired for their beauty and agility. The horse we call a Gennet owes that denomination to the Spanish school of horsemanship, where the rider, mounted in the moorish stile, with short stirrups and a high saddle, is said to ride *a la gineta*. The word *Ginete* is applied to the cavalier and means a horseman. Thus in the captive's tale in *Don Quixote*, "Apenas uvo dicho esto el Christiano cautivo quando el ginete se arrojó del cavallo y vino a abraçar el mozo." With these swift horses and accoutred *a la gineta*, the Spaniard encounters the bull. See the following books:

Discur-

Discursos para estar a la gineta con gracia y hermosura por Don Juan Arias de Avila. Madrid, 1590. 8vo.

Libro de ejercicios de la gineta por Bernardo de Vargas Machucha. Madrid, 1600. 8vo.

Exercicios de la gineta por Don Gregorio de Tapia. Madrid, 1643.

Manejo Real por Don Manuel Alvarez Oforio y Vega Conde de Grajal. Madrid, 1733.

The great swiftness of the Spanish horses perhaps gave rise to their fabulous origin, which was humorously alluded to by Mr. Addison, in one of his papers, in the *spectator*, N^o 127, vol. 2. where speaking of the ladies dress at that time, he says, "Were they like Spanish gennets to impregnate by the wind, they could not have thought on a more proper invention."

L E T T E R XIV.

Mr. Bowles informs us, that after the most diligent observation in that singular range of hills of the *Sierra Vermeja*, he could find nothing which seemed to confirm the opinion relating to the saliant and reentrant angles of Bourget, and other modern philosophers, which the Abbate Fortis, in his late travels through Dalmatia seems further to have ingeniously refuted. "That system, says he, seems to have found more partizans than it deserved, and several of them have gained themselves no honour by adopting it. It was sufficient indeed to stay in their chambers, and to theorise at their ease on good geographical

phical maps, concerning the truth of the proposition, *That the sides of the large vallies, as well as those of the shores of the sea correspond with one another*, and I, who have taken the trouble to examine many of them, am persuaded, that *neither the sides of the sea shores, nor those of the large vallies constantly correspond with each other.*"

Mr. Bowles assures us, in his introduction, page 13, That though England, France and Germany abound with chalk hills, he never observed the least appearance of any such in Spain, of that sort described by Cronsted, under the title of *terra calcaria, pura solida friabilis*. Sect. vi.

I could have wished to have laid before my readers a more exact account of the fish on the different coasts of Spain, but this requires a fixed residence in the sea ports; moreover all communication being at present interrupted, it has prevented me not only on this occasion, but on some others, from giving more accurate information. Don Bernardo de Ulloa says, they catch a species of fish, on the coast of Galicia, like our cod, which would be as useful as that from the banks of Newfoundland, if any encouragement was given to the fishermen.* The best scallops are caught on the coast of Galicia near Compostella, insomuch that on account of their luscious taste and other properties, they are said to be in high esteem with the pilgrims of both sexes, who resort to the shrine of Santiago at Compostella. In former times the Tunny fishery

* Restablecimiento de las fabricas y comercio Espanol por Don Bernardo de Ulloa. Madrid, 1740. This gentleman was father to the present Admiral of that name, Don Antonio, de Ulloa, of whom mention is made in the course of this work.

fishery was very considerable on the coast of Andalusia, near Conil ; but when Don Bernardo de Ulloa, was writing, he complains, that the fisheries that used to bring in a revenue of eighty thousand ducats to the territory of Medina Sidonia was then reduced to eight thousand. The places where they catch the fish, are called *Almadras*.

Our wine trade with Spain is so considerable, that it has induced me to enumerate the various sorts of wine which that kingdom produces :

Biscay,	Chacoli,	-	} See page 167 of this work.	
Castile,	{	Vino de guindas,	} A wine made with cherries.	
		Foncarral,	-	} A light red wine, and one of the best drank at Madrid, from the village of that name near Madrid.
		Valdepenas,	-	} A most excellent light red wine, with a very pleasing flavour.

Castile,

Castile,			In La Mancha. The
	Ciudad Real, -	}	wine from this
		}	place praised by ho-
		}	nest Sancho Panza,
		}	who loved his bot-
		}	tle.
	La Mancha, -	}	The light red wine
		}	common in La
		}	Mancha, and very
		}	good.
	*Ribadavia, -	}	An agreeable white
		}	wine from the dis-
		}	trict of Rioja.
	Saragossa, -	}	A rich red wine, very
		}	stomachick.
Aragon,			
	Carinena, -	}	Another growth with
		}	the same quality.
	Peralta, -	}	A choice strong white
		}	wine.
	Tudela, -	}	These are all choice
	Tafalla, -	}	
Navarre,	Falces, -	}	
	Villa Franca, -	}	
	Puente de la Rey-	}	
	na, -	}	wines; there are
		}	many others of a
		}	more indifferent
		}	quality.

H h

Navarre,

Navarre,			
Estella,	-	}	A very indifferent wine, which will not keep.
Arandillo,	-	}	This wine is made with bilberries. It is also called <i>Raf-pana</i> .
Xerez,	-	}	Our sherry of the dry fort.
Pagarete,	-	}	A more choice fort of sherry wine, and very stomachick. A most excellent wine.
Andalusia		}	Good wine, but not so delicate as the sherry, though the vineyards of each district join, owing to its not being made with so much attention as by the people of Xerez.
San Lucar,	-	}	
			Andalusia,

Andalusia

Tinto de Rota,

The wine we call
Tinto, from Rota,
near Cadiz, the
word *tinto* used for
red wine, in oppo-
sition to white, as
with us, the word
tint implies colour.

Montilla, -

A light white wine,
much esteemed in
Seville.

Malaga, -

Our mountain.

Pedro Ximenes,

A richer sort of Ma-
laga wine.

Granada, Malvasia, -

Malmsey, a rich wine
so called, in imita-
tion of that luscious
wine from
Malvasia, a city of
Peleponnesus, in
Greece, the anti-
ent Epidaurus,
from whence this
precious wine was
first imported.
This name is giv-
en to different
growths of wine
Granada,

H h 2

Granada,			from Alicant and the Canaries, called sack in English, from the Spanish word <i>zaque</i> , a skin to put wine in.
	Marvella,	-	A lighter wine than the mountain Malaga; this growth is near the sea in the vallies.
	Tinto de Alicante,		Sweet red wine.
	Benicarlo,	-	Strong thick red wine; much of it goes to Bourdeaux, and is mixed with low priced clarets.
Valencia,	Villa Nova,	-	A red wine between the quality of Benicarlo and Mataro.
	Sitges,	-	A most excellent white wine from the place of that name.
Catalonia,	Garnacha,	-	A sweet red wine.
	Tinto de las Montanas,	-	Sweet red wine.
			Catalonia,

Catalonia,			
	Vals,	}	A light sweet wine,
			which with age be-
			comes dry.
		}	A coarse red wine
			from the town of
			that name, near
	Mataro,	}	Barcelona, some-
			thing like port. It
			is often sold in
			London.

L E T T E R X V.

The culture of Barrilla seems to be a very old standing at Alicant; Mr. James Howel gives a particular account of it in a letter to Christopher Jones, Esq; dated from Alicant, 27th March, 1621; wherein he tells him, "I am now (thanks be to God) come to Alicant, the chief rendezvous I aimed at in Spain, for I am to send hence a commodity called barrilla, to Sir Robert Mansel, for making of crystal glafs. This barrilla is a strange kind of vegetable, and it grows nowhere upon the surface of the earth, in that perfection as here. The Venetians have it hence, and it is a commodity whereby this maritime town doth partly subsist, for it is an ingredient that goes to the making the best Castile soap. It grows thus; it is a round thick earthy shrub that bears berries like barberries, betwixt blue and green; it lies close to the ground, and when it is ripe they dig it up by the roots, and put it together in cocks, where they leave it to dry many days like hay; then they

they make a pit of a fathom deep in the earth, and with an instrument like one of our prongs, they take the tuffs and put fire to them, and when the flame comes to the berries, they melt and dissolve into an azure liquor, and fall down into the pit till it be full; then they dam it up, and some days after they open it and find this barrilla juice turned to a blue stone, so hard that it is scarce malleable; it is sold at one hundred crowns a tun, but I had it for less. There is also a spurious sort called *gazul*, that grows here, but the glass that is made of that is not so resplendent and clear. I have been here now these three months, and most of my food hath been grapes and bread, with other roots which have made me so fat that I think if you saw me you would hardly know me, such nurture this deep sanguine Alicant grape gives."

L E T T E R XVII.

From what I have said of Valencia, it may perhaps be thought a picture drawn from imagination, but to shew I am not the only writer who has sounded forth the praise of that country, I shall add the account given of it by Mr. Howel, in a letter to Dr. Fr. Mansel, dated Valencia, 1st March, 1620.

"I am now in Valencia, one of the noblest cities in all Spain, situated in a large *vega*, or vally above sixty miles compass. Here are the strongest silks, the sweetest wines, the excellentest wines, the best oils and beautifullest females of all Spain, for the prime curtisans in Madrid

Madrid and elsewhere are had hence. The very brute animals make themselves beds of rosemary and other fragrant flowers hereabouts; and when one is at sea, if the wind blows from the shore, he may smell this soil before he comes in sight of it, many leagues off, by the strong odoriferous scent it casts. As it is the most pleasant, so it is also the temperatest clime of all Spain, and they commonly call it the second Italy, which made the Moors, whereof many thousands were disordered and banished hence to Barbary, to think that Paradise was in that part of the heavens which hung over this city."

Amongst other gay flowers which adorn our parterres, we are indebted to Spain for the musk rose, or *rosa sempervirens*, thus described by Linnæus:

*Rosa sempervirens. Germinibus ovatis pedunculisque hispidis
caule petiolisque aculeatis.*

Seed buds egg shaped, covered with strong
bristly hairs, as are likewise the fruit stalks.
Stem and leave stalks prickly.

The plants of these and some other kinds of roses were found growing naturally in Spain, by the late ingenious Robert More, Esq; of Lindley in Staffordshire, who sent the seeds to Mr. Miller, who raised them in England; the flowers are single, white, and have a strong musky odour; they appear in August, and if the autumn proves favourable, will continue in succession till October. Miller's gardeners dict.

The

The Spanish arum, is the *arum maculatum* of Linnæus, "Wake Robin, cuckow pint, lords and ladies." It is a small plant, common in most parts of Spain, particularly in Biscay. The roots and leaves when recent, are extremely acrid. The root has been employed in medicine as a stimulant, but when reduced to powder it loses much of its acrimony. The French make use of the root dried and powdered to wash their skin with, it is sold at a high price, under the name of cyprus powder, and is an innocent cosmetic. When the acrimony of the roots is extracted, either by boiling or baking, they certainly will afford a mild and wholesome nourishment. Many nations prepare the only bread they have from plants as acrimonious as this, first dissipating the noxious qualities, by force of heat. Starch may be made from the roots. It grows in England in shady places, ditch banks and rough grounds. "Dr. Withering's botanical arrangement, &c." There are eighteen varieties of this plant mentioned by Miller, five of which have mild roots, and are eaten by the inhabitants of the hot countries where they grow naturally; sometimes the leaves are boiled and supply the want of other greens, and are esteemed wholesome food, in places where the common European vegetables are with difficulty found; but these do not include the Spanish sort which Mr. Bowles conjectured might in years of scarcity serve as a succedaneum to bread.

The *Anchusa* mentioned by Mr. Bowles is the lithospermum of Linnæus, with a red root. The alkanet. In Spanish *orcaneta*. The bark of the root tinges wax and oil of a beautiful red. In the northern parts of Europe,

Europe, girls paint their faces with the juice of the root upon days of festivity. We have it in England. The gromewell. "See the variety of it in Dr. Withering's botanical arrangement."

I am informed that some plants of the *Chirimoya* are now growing in England, raised from seeds brought from Peru. Fruit cannot be expected from them, but should they flower their exquisite odour will make some amends for that deficiency.

L E T T E R XVIII.

The Spanish poem entitled *Montferrate*, by Christopher de Virues, a poet of Valencia, is praised by Cervantes, in his review of Don Quixote's library, as one of the best in that language, equal to the *Araucana* of Don Alonso de Ercilla, or the *Auftriada* of Juan Rufo; to all which the Curate gives the following praises, "These three poems are the best that ever were composed in heroic verse in the Spanish language, and may vie with the most celebrated poems of Italy; let them therefore be carefully preserved as the choicest specimens of poetry that Spain is possessed of." Don Quixote, part I. chap. 6.

L E T T E R XXIII.

Gassendi, in his life of Pyresc, tells a laughable tale of a shepherd of Tarragona, of whom he gives the following account, "He reasoned moreover, touching the engrafting of animals after the manner of plants, upon occasion
of

of a floe or bullace tree gowing out of a man's breast-bone. A shepherd of Tarragona had fallen upon a floe tree, and a sharp point thereof having run into his breast, it took such a root in ten years time, that after many branches had been cut off, there sprung up some at last which bear both flowers and fruit. Now he (Pyrese) would never be at rest till Cardinal Barbarini procured the archbishop of that place to testify the truth of the story, and the Chevalier Dupuy not only received letters testifying the same, but also certain branches thereof which he sent unto him. Whoever shall see such things as these, says Gassendi, may safely believe them ! Natural history, in those days, lay yet enveloped in fable ; it is to the present age we owe so many discoveries and experiments, which have elucidated and ascertained the different parts of that useful and admirable science. If our neighbours were not enlightened in those days, we also came in for our share of their ignorance. When Sir Robert Dudley and Mr. Thomas Cavendish sailed on an expedition to the West Indies, we are told that as soon as the English went on shore in the night, observing an infinite number of moving lights in the woods, they mistook them for Spaniards coming upon them unawares, with their firelocks and match-lights ; on which they fled in haste to their ships, though it turned out to be nothing else but a number of those harmless insects called lantern flies. See Hackluyt's voyages, vol. 3.

Travellers have observed, that there are no swans in Spain, and that you may go for many days together and never see a goose : if we reflect on the national abhorrence of the Spaniards to the Jews, and to their manners and

and customs, it may perhaps afford some new light to this singularity, and account for the want of the latter of these birds, from what Dr. Moffet says of them from Jason Pratensis, "That the Jews' have so hard a flesh, so foul a skin, so loathsome a savour, and so crooked conditions, because they eat so many geese." Swans flesh was forbidden the Jews, because by them the hieroglyphical fages did describe hypocrisy; for as swans have the whitest feathers and the blackest flesh of all birds, so the heart of hypocrites is contrary to their outward appearance. This latter however, being a prejudice of an innocent nature, might have gained a more general admittance, being merely symbolical.

In a review of the most remarkable parts of the animal kingdom in Spain, we shall find that they possess the noble Andalusian horse, the large ass, the bear, the lynx, the ravenous wolf, the wild cat, the gennet, the fleet greyhound, and the staunch pointer; also the wild boar, whose flesh is so dainty, that Strabo says, The *Carietes* of Spain, were the best makers of sausages and wild meats in the whole world. Rabbits were so numerous, that they gave their name to the whole country. It has been hinted by Arabic writers, that even the zebra belonged originally to Spain.* They seem to have been well known in the days of Cervantes, who frequently alluded to their swiftness. The *Cebrero* cheese has nothing to say to this animal, but takes its name from the village of *Cebrero* where it is made, in the bishopric of Avila, as a corruption of the word *Mons Ciperius*. Perhaps the fine Eng-

lish

* See Casiri's bibliotheca arabica Hispan. Escorialensis. 2 vols. folio, printed at his Catholic Majesty's expense.

lish spaniel came originally from Spain ; what shall we say of the young Spanish puppies, a food once much esteemed, if any credit is to be given to that writer, who after praising the moose deer in America adds, “ Their flesh is an admirable dish beyond that of an ass’s foal, so highly esteemed by the Romans, or of *young Spanish puppies, so much cried up in our days in England and France.*”†

With respect to birds we shall find the golden eagle, the vulture, the stork, the flamenco, the bee eater, the hoopoe, the bustard, the beautiful partridge, the becafigo, the solitary sparrow, and others of less note. As for insects the silk worm affords them immense revenues, the bee yields excellent honey ; the insect from whence they get the kermes has been treated of, and the cantharides, or Spanish flies, are well known in our shops. Moschetoes and flies, it is true, are very troublesome in the day-time, particularly in the southern provinces ; but to make amends, the nights are reviving, the stars shine with infinite brightness over your head, while numberless glow worms glisten under your feet. If you walk out in the evening the fields appear enamelled with a variety of flowers, and at every step the green lizard escapes from your sight, as Virgil has said,

Nunc virides etiam occultant spineta lacertos.

† New England’s rarities discovered in birds, beasts, fishes, serpents and plants, by John Josseline, London, 1672. Dr. Moffet, likewise says, As for the flesh of young puppies, commended by Hippocrates and afterwards by Galen, however in the isles of Corsica and Malta they are still esteemed as good meat, yet Cardan considers them, in his history, as bad meats, which neither use nor reason hath confirmed.

The following List of Vegetables, growing upon Mount Calpe, or Hill of Gibraltar, is given by way of evincing the Fertility of that Climate.

A.	B.
ACACIA - June Back of the hill	Balm, garden - Dec. front
Adder's tongue Dec. - - -	Balm of Cappadocia - - - Apr. - - -
Alder black - Nov. front	Balm Peru - - - - -
Ale hoof - - Dec. back	Barbary bush - Dec. front
Alexander - Nov. - - - -	Barianas, garden - - - -
All heal - - Dec. front	Barley - - Dec. - - -
All clown heal - - on the top	Bay tree - - - - -
Almond tree - - - front	Bay of Alexandria - - - comm.
Aloe black - - - - -	Bean, garden - Oct. front
Amomum, the true, - - - Apr.	- - - horfe - - - - -
and common - - - back	- - - Malacca - - - - -
Apple - - - Apr. town	Bears breech - Dec. back
Archangel, red and white - - - back	Bears foot - - - - -
Arrach, garden	Bed, ladies straw - - - comm.
stinking - - - Dec. back	Beets white and
Arse-smart, hot	red - - - Nov. front
and spotted - - - comm.	Behen - - - Dec. - - -
Artechoke - - - Nov. front	Benjamin - - - Nov. - - -
Asarabacca - Dec. comm.	Betony, Paul's Dec. - - -
Asparagus - - - - -	- - - - - water - - - - -
Asfa-fetida - - - back	- - - - - wood - - - - -
Avens - - - front	Bindweed, green All the year
	- - - - - rough - - - comm.
	Birdlime - - - Dec. front
	Birthwort

Birthwort long ——— - - -	Calamint water Dec. front
———— round ——— - - -	———— common ——— garden
———— wooded run-	Calabashes - garden
ning - - - ——— - - -	Calthrops - ——— over
Bishops weed - Dec. - - -	the hill
———— cand-weed ——— - - -	Carduus benedic-
Bitter sweet - Nov. front	tus - - - ——— front
Blackberry bush	Cammock - ——— back of
and bramble Dec. comm.	the hill
Blites bush - front	———— wild, all
Blue bottle the	the year - - - comm.
greater - front	Camphorata Dec. - - -
Blue bottle the	Campions - - - -
small - - - Dec. - - -	Carota - ——— garden
Boxtree, garden ——— - - -	Cassia purgens Oct. front
Borage - ——— comm.	Carrots - Dec. garden
Briony, black - ——— - - -	Catmint - Oct. comm.
Brook lime - ——— front	Centaury, the
Broom Spanish ——— comm.	great, - Mar. front
Buckthorn plan-	———— small ——— - - -
tain - ——— - - -	Chervil - Dec. comm.
Bugloss, wild gar-	Chickweed - ——— - - -
den - ——— front	Citron - ——— front
———— viper - ——— - - -	Citrul - Apr. - - -
Burdock, gr. gar-	Clevers - Dec. comm.
den - ——— back of	Clove gilliflower ——— garden
the hill	Clover grafs - ——— front
Burdock, small	Clown's mustard ——— - - -
garden - ——— - - -	Coleworts - ——— garden
Butterbur - ——— comm.	Columbine - ——— - - -
	Comfrey - ——— - - -
C.	Cucumber, garden and
Cabbage, garden Oct. front	wild cauch grafs ——— front
Calamint, moun-	Cranebill - comm.
tain - comm.	———— musty - - -
	Cresses

Cresses	-	July garden	—	hogs	—	comm.
— water	-	Dec. front	—	giant	-	—
— wild	-	— comm.	Feverfew	-	—	—
Crowfoot	-	Nov. —	Fig tree	-	Feb.	—
Cuckow flower	-	Dec. front	— water	-	—	—
— tree	-	—	— wort, common	—	—	—

D.

Daify, great	-	Dec. comm.	Fetch,	-	Dec.	—
— small	-	—	Flagfweet	-	July	—
Dandelion	-	—	Flax toad	-	Dec.	—
Danewort	-	—	Flax, mountain	—	—	—
Date tree	-	— front	Flower de luce	—	garden	—
Devil's bit	-	— comm.	Foolstones	-	Mar. front	—
Dill	-	—	French lavender	—	—	—
Dittany, white	—	—	Fumetory	-	—	—
— Crete	—	—				
Dock, common	—	—				
— sharp	-	—				
Dodder & thyme	—	—				
Dog's grafs	-	—				
— rose	-	—				
Dropwort	-	—				
Ducks meat	-	— front				

E.

Elder	-	Feb. comm.
Elder, dwarf	—	Dec. —
Endive	-	— garden
Eye bright	-	Mar. front

F.

Fennel	-	Dec. comm.
— flower	—	gardens

G.

Garlick	-	Dec. front
Garvanzas	.	garden
Gention	-	— front
Glliflower, stock	—	garden
Gladwyn	-	Mar. front
Goats rue	-	Dec. comm.
Ground pine	-	—
Groundfel	-	—
Gum Arabic	-	—

H.

Hare's foot	-	Dec. comm.
Hart's tongue	—	—
Hartwort	-	—
Hartthorn	-	—
Hedge mustard	—	front
Hellebore, black	—	comm.
Hellebore,		

Hellebore white	— — — —	L.
Helmet flower	— — back	Lady's bed, yel-
Henbane	- - — — comm.	low - Dec. front
Herb Robert	— — front	— — mantle May comm.
Holly, sea	- - — — -	— — smock - - - - -
Holly oak	- - — — garden	Larkspur - - Dec. - - -
Honeyfuckle	- - — — comm.	— — spike - — - - -
Horehound	- - — — back	— — cotton - — - - -
Horfe-tail	- - — — -	Laurel spurge — — - - -
— — tongue	- — front	— — Alexandrian — — - - -
Horehound, stink-		Leek - - - - -
ing	- — — — comm.	Lentils, garden
Hound's tongue	— — - - -	Lemon tree - July - - -
Houfeleek, great	— — - - -	Lettuce - Dec. - - -
— — small	— — - - -	Lime tree - - - back
		Locust tree - - - comm.

I.

Jacinth	- - Dec. garden
Indian corn	-
Jejube tree	
Jerusalem cowslips	July front
Jew's ears	- Dec. comm.
St. John's wort	— — front
St. James's	— — - - -
Jointed grafs	- — — - -
Ivy	

K.

Kidney wort	- Dec. comm.
King's spear	- — - - -
King's broom	- front
Knot grafs	- Dec. comm.

Loofe stripe, yel-	
low	- May back
Lovage	- - Dec. front
Limewort	- - - - -
— — spotted	- - - - -
Lupine	- - - garden

M.

Maidenhair tree	Dec. front
— — English	- - - comm.
Mallow, common	- - - - -
— — marsh	- - - - -
— — vervain	- - - - -
— — musk	- - - - -
— — garden	- front
Mandrake	- - - - -
	Marjoram,

Marjoram, sweet - - - garden	Mushroom wild Dec. garden
——— wild - Jan. comm.	
Marygold - Dec. garden	N.
Masterwort - Dec. front	Navelwort - - Dec. front
Maſtick - - - ———	Nettle - - - ———
Maudlin, sweet - - - ———	——— dead - - ———
Mary weed - - - - comm.	Nettle dead ſtink-
Melon, muſk - garden	ing Dec. front
Melon, water - ———	Nightshade - - ———
Mill mountain Dec. comm.	——— deadly ———
Mint, cat - - - ———	——— woody ———
——— ſpear - - - ———	O.
——— water - - - ———	Olive tree — July front
——— horſe - - - ———	Onion — — Dec. ———
——— pepper - - - ———	Opium — — ———
Myrtle - - - - - garden	Orange tree - July ———
——— wild - - - - back of	Ox-eye — — ———
the hill	P.
Moonwort - - - - - comm.	Palm tree — July front
Mofs tree, all the year	Parſley — — Dec. ———
- - - ſea - - - Dec. ———	Piaſt — — ——— back
- - - ground - - - ———	Parſnep — — ——— garden
- - - of a dead man's	——— wild - ——— back
ſcull - ———	Peach tree — July front
Mother of thyme - - - front	Peaſe — — Feb. garden
Motherwort - - - - comm.	Pellitory of the wall
Mouſe ear - - - ———	of Spain ——— comm.
Mugwort - - - ———	Pennyroyal - - Dec. front
Mulberry tree Feb. garden	Pepperwort - ———
Muſtard - - - Dec. comm.	Pimento - - ———
Muſhroom - ſouthward and	Pilewort - - ——— comm.
meadow	Pine ground - ——— back
	Plough,

Ploughman's Spi-		Savory - - - -	garden
kenard	Dec. front	Sanders - - - -	front
Poley mountain	Dec. comm.	Sea green house	
Polypodium -	_____	leek	Feb. _____
Pomegranate -	July front	Shepherd's purfe	Dec. comm.
_____ poppey	Dec. comm.	Sloe tree - - - -	_____
_____ wild	_____	Snake weed - - - -	_____
_____ white	_____	Solomon's seal - - - -	garden
Primrose -	_____	Sopewort - - - -	front
Purflain -	_____ garden	Sorrel - - - -	comm.
		Sorrel wood - - - -	_____
		Southern wood - - - -	garden
		Sow thistle - - - -	comm.
		Spignell - - - -	_____
		Spinage - - - -	_____
		Spikenard - - - -	front
		Spurge - - - -	comm
		Starwort - - - -	_____
		Sarthistle - - - -	Feb. _____
		Swallow-wort - - - -	_____
			T.
		Tansey - - - -	Dec. comm.
		Tares - - - -	_____
		Thistle blessed	Feb. _____
		Thyme mother of	_____
		Thyme - - - -	_____
		Toad flax - - - -	_____
		Tobacco - - - -	Dec. _____
		Tomates - - - -	garden
		Tormentil - - - -	front
		Thorn - - - -	_____
		Trefoil - - - -	Dec. all over
		Turnep - - - -	front

V. Vine

V.

W.

Vine - - -	Feb. comm.	Wall flower -	Dec. garden
Violet - - -	Dec. garden	Woodbine - - - -	comm.
Viper grafs - - -	comm.	Woodroof -	Apr. ———
Vervain - - - - -	front	Wormwood ro-	
		man	- - - front

They have extraordinary mallow trees, (the seeds of which they had from Spain) about two years old, and are now (1778) 14 feet high. They are always green, and flower in April, May and June, supposed to be unknown in England.

✂ Just as I am closing this work, I find the following article inserted in the foreign news-papers, dated Oviedo, April 12, 1780: The Count de Torena and Father Ignatius Buenaza have been employed upwards of a year, by orders of the council of Castile, in examining several mines of ocre and various coloured alum. They have since discovered an exceeding fine quarry of alabaster, abounding with the most beautiful stones, held by the connoisseurs to be equal in whiteness to those of Mount Taurus. Ours are however larger and more proper for columns and statues. They have also examined a mine of jet, the stones of which much resemble those of Calcite. Great quantities of pit coal are found in the neighbourhood of Coboalles. In the district of Cangas they have discovered a mine of stones resembling agate and alabaster; and in the hamlet of Carrofin they found a crystal which has the brilliancy of a diamond. These expert naturalists have sent specimens of all these stones and minerals to the council.

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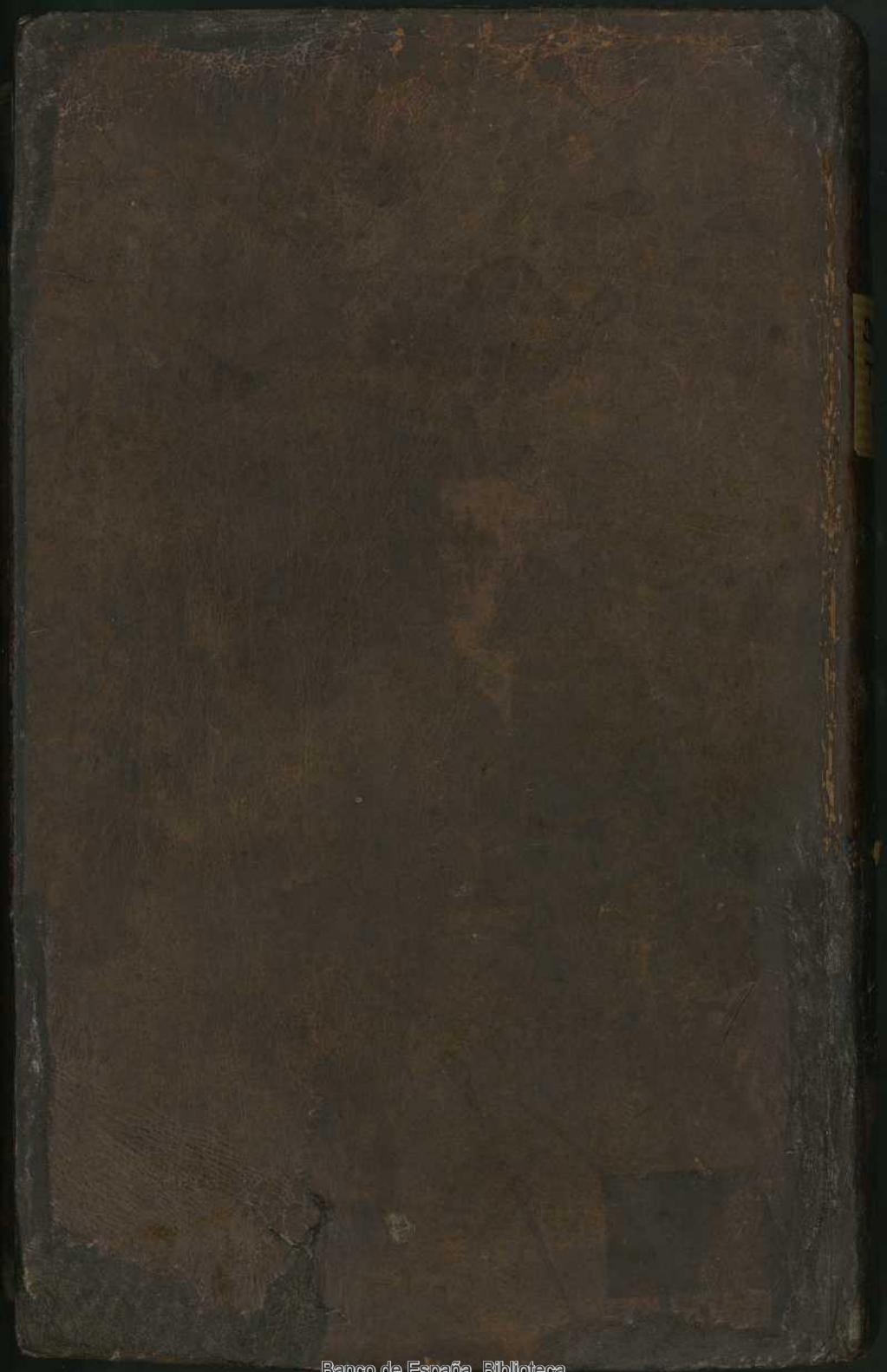
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DILLON'S
TRAVELS
SPAIN.
1781.

